

JPRS-JST-93-006
12 FEBRUARY 1993



**FOREIGN
BROADCAST
INFORMATION
SERVICE**

JPRS Report

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

Science & Technology

Japan

STA SURVEY REPORT ON PROMOTION OF
REGIONAL SCIENCE AND TECHNOLOGY

19980506 081

OTIC QUALITY INSPECTED 2

SCIENCE & TECHNOLOGY JAPAN

STA SURVEY REPORT ON PROMOTION OF REGIONAL SCIENCE AND TECHNOLOGY

93FE0191A Tokyo SCIENCE AND TECHNOLOGY AGENCY in Japanese Aug 29 pp 1-309

CONTENTS

Introduction.....	1
Table of Contents.....	3
Summary.....	5
1. Background and Objective.....	11
1.1 "Regional Vitalization" Viewpoint.....	12
1.2 "Science and Technology" Viewpoint.....	12
1.3 "National Policy" Viewpoint.....	12
1.4 Attempt To Systematize "Regional S&T Policies".....	13
2. Survey Content and Method (Overview).....	15
2.1 Status Survey of Handling of Comprehensive S&T Policies Initiated by Local Governments.....	15
2.2 Status Survey of S&T-Related Budgets of Prefectures and Designated Cities.....	17
2.3 Status Survey of Diverse Research Consortia Formation.....	17
2.4 Status Survey of Research Activities by Public Research Institutions.....	18
2.5 Identification of Newly Established Regional R&D Organizations and Status Survey of Research Activities by Such Organizations.....	18
3. Comprehensive Promotion of S&T Policies Initiated by Local Governments.....	20
3.1 Establishment of S&T-Related Councils.....	20
3.2 Adoption of Basic Guidelines for S&T Policies.....	21

4. Comparison of Regional S&T-Related Budgets.....	32
4.1 Regional S&T-Related Budgets.....	32
4.2 Regional Comparison of S&T-Related Budgets.....	48
5. New Regional S&T Policies.....	68
5.1 Improvement of R&D Infrastructures.....	68
5.2 Support for R&D Activities.....	75
5.3 Training Research Personnel and Science Education.....	53
5.4 Response to Internationalization.....	82
6. Establishment of Organizations for S&T Promotion and Their Funding (Nonadministrative).....	87
7. Formation of Diverse Research Consortia.....	100
7.1 Survey Objective.....	100
7.2 Survey Method.....	100
7.3 Current Status of Research Consortia.....	104
8. Research Activities of [Regional] Public Research Institutions.....	105
8.1 Survey Objective.....	105
8.2 Survey Design.....	105
8.3 Survey Implementation.....	106
8.4 Analysis and Survey Results.....	106
9. Summary of Survey Results.....	136
10. Conclusion.....	143
11. Future tasks.....	147
(Appendices) [not translated]	

STA Survey Report on Promotion of Regional S&T

93FE0191A Tokyo SCIENCE AND TECHNOLOGY AGENCY in Japanese Aug 92 pp 1-147

[Text] Introduction

In the past, "regions" and "science and technology [S&T]" were relatively rarely discussed together.

"Science and technology" [S&T] as a "phrase" remained mainly in the realm of such megasciences as atomic energy and space rockets, while S&T as a "concrete entity" remained behind the scenes of regional economies in the form of industries or people's lives through medicine and welfare. People very rarely argued for the "promotion of regional science and technology."

Recent changes in social conditions have expanded the meaning of the phrase S&T and put a more concrete face to it. While grand social transformations for the next generation are taking place in the former Soviet Union, Europe and elsewhere, the concept of S&T itself as well as the thinking on a "concrete entity" that will develop S&T are less defined.

Basic S&T policy must also be interpreted in this context. "Regional S&T activities must serve as the prime mover of regional vitalization and contribute to the formation of a multicentral, distributed nation. The activities must also respond in detail to diverse regional needs, and must improve the quality of life of regional residents." This clear-cut mission demands a systematic consolidation of "regions" and "science and technology." What regional entity will promote what kind of S&T in what way? Who will write the scenario? The long-range goal of this survey study is to respond to the needs for a "systematic development of regional S&T policies" from the viewpoint of a policy study. "Chaos-Network-Cosmos"—it is necessary to start with an understanding of the current status of regional S&T, since no one has elucidated the current status.

As part of an effort to understand the current status, this survey identifies the S&T policies of local governments, i.e., metropolis, prefectures and cities designated by a government ordinance [designated cities]. A large part of the survey suffers from the limitation that the survey was conducted for only one year, but we expect that this report will contribute to the systematic consolidation of "regions" and S&T by serving as basic data.

In conducting this survey, we established a "Society to Survey and Study Regional S&T Promotion" (October 1991) that consisted of the following experts, and we have benefitted from their guidance.

We are also grateful for the cooperation provided by the staff of many government ministries, agencies, and regional organizations.

We could not have completed this survey without their cooperation. We sincerely thank them.

Society to Survey and Study Regional Science and Technology Promotion
(Random listing, titles omitted)

- Chairman: Hitoshi Kamada, chairman of the board, Technopolis Foundation, Yamagata Prefecture
- Member: Tadao Tasaki, acting chief, S&T Policy Section, Planning Division, Kanagawa Prefecture
- Member: Hiroshi Nakatsuka, director, Shizuoka Engineering Technology Center, Shizuoka Prefecture
- Member: Naohiko Muto, manager, Central Office, S&T Promotion Foundation, Fukuoka Prefecture
- Member: Yasuo Watanabe, director, Research Division, Osaka Bioscience Research Institute
- Member: Hisayoshi Hashimoto, chief, Industrial Location Guidance Division, Industrial Location and Environmental Protection Bureau, Ministry of International Trade and Industry [MITI]
- Member: Mitsugi Chiba, former chief, Planning Section, Policy Division, Science and Technology Policy Bureau, Science and Technology Agency [STA]
- Member: Hidefumi Ueda, chief, Planning Section, Policy Division, Science and Technology Policy Bureau, STA
- Member: Akihiko Omori, former chief, Research and Development Promotion Division, Science and Technology Promotion Bureau, STA
- Member: Tsutomu Imamura, chief, Research and Development Promotion Division, Science and Technology Promotion Bureau, STA

National Institute of Science and Technology Policy

The Second Research Group: Kinji Gonda, supervising principal researcher
Takeshi Yamamoto, special researcher
Shigeo Baba, special researcher

The Fourth Survey Research Group:
Tamotsu Sakamoto, supervising senior researcher
Hirokatsu Watatani, senior researcher
Rika Maekawa

Contents

	[Original page Nos.]
Introduction.....	1
Table of contents.....	11
Summary.....	1
1. Background and Objective.....	7
1.1 "Regional vitalization" viewpoint.....	8
1.2 "Science and technology" viewpoint.....	8
1.3 "National policy" viewpoint.....	9
1.4 Attempt to systematize "regional S&T policies".....	9
2. Survey content and method (Overview).....	11
2.1 Status survey of handling of comprehensive S&T policies initiated by local governments.....	11
2.2 Status survey of S&T-related budgets of prefectures and designated cities.....	13
2.3 Status survey of diverse research consortia formation.....	14
2.4 Status survey of research activities by public research institutions.....	14
2.5 Identification of newly established regional R&D organizations and status survey of research activities by such organizations.....	15
3. Comprehensive promotion of S&T policies initiated by local governments.....	17
3.1 Establishment of S&T-related councils.....	17
3.2 Adoption of basic guidelines for S&T policies.....	18
4. Comparison of regional S&T-related budgets.....	27
4.1 Regional S&T-related budgets.....	27
4.2 Regional comparison of S&T-related budgets.....	44
5. New regional S&T policies.....	67
5.1 Improvement of R&D infrastructures.....	67
5.2 Support for R&D activities.....	75
5.3 Training research personnel and science education.....	77
5.4 Response to internationalization.....	83
6. Establishment of organizations for S&T promotion and their funding (nonadministrative).....	85
7. Formation of diverse research consortia.....	91
7.1 Survey objective.....	91
7.2 Survey method.....	91
7.3 Current status of research consortia.....	94
8. Research activities of [regional] public research institutions.....	96
8.1 Survey objective.....	96
8.2 Survey design.....	96
8.3 Survey implementation.....	97
8.4 Analysis and survey results.....	97

9. Summary of survey results.....	134
10. Conclusion.....	142
11. Future tasks.....	146
(Appendices) [not translated]	

Summary

(Objective and Method)

With the rapid changes in economic society and S&T in recent years, more regional public organizations recognize the necessity of promoting S&T centered around basic research.

In the "Basic Science and Technology Policy" adopted at a recent cabinet meeting, the government has accepted the "promotion of regional S&T" as a high priority policy.

Regional S&T activity serves as a "prime mover of regional vitalization" and "improves the quality of life of regional residents." With this view, regional governments themselves are beginning to tackle S&T promotion. It is an urgent task for the central government to enthusiastically support these activities from the viewpoint of improving the national level of S&T and to propose a new system of promoting S&T by linking regional governments.

In this survey and study, we have conducted a comprehensive survey and study on the systems and implementations of S&T promotion by local governments. This is the first step toward a systematic identification of the current implementation status and an overall picture of the status of regional S&T policies—a systematization of "regional S&T policies."

This survey was conducted with the following five status surveys and hearing surveys:

1. Status survey on how prefectures are taking initiatives and coping with comprehensive S&T policies;
2. Status survey of S&T-related budgets of prefectures and designated cities;
3. Status survey on the formation of diverse research consortia;
4. Status survey on the research activities of public research institutions; and
5. Identification of newly-established regional R&D organizations and a status survey of their research activities.

(Survey Results)

1. Systems To Promote S&T Policies

Eleven prefectures have established S&T-related councils, and the number of prefectures that have adopted basic guidelines for S&T policies has reached nine. However, there are only three prefectures which use the phrase S&T in the title of the administrative units which deal exclusively with S&T policy.

2. Total Regional S&T-Related Budget

The total regional S&T-related budget of prefectures and designated cities was estimated to be ¥573.2 billion, about one-quarter (26.7%) of the total national S&T-related budget, ¥2.1407 trillion. The ratios of the S&T-related budgets to the total budgets are similar, 1.36% in the national budget versus 1.26% in local government budgets.

The details of the budget indicate that the largest part, about one-third, went to agriculture, forestry and fishery related budgets, and the second largest part, about one-quarter, went to commerce and industry related budgets. About 60% (61.7%) of the budget went to public research institutions.

3. Relation Between Regional S&T Budgets and Industrial Structures, Prefectural Gross Products, and Financial outlays

Regional S&T-related budgets are very diverse—between ¥2.7 billion and ¥21.5 billion among prefectures and between ¥800 million and ¥15.2 billion among designated cities.

We detected a correlation between S&T-related budgets and prefectural populations and gross products, but we did not detect any simple correlation between "industrial structures" and the "establishment of administrative offices to handle S&T-related budgets." More detailed analyses are needed on these findings, as well as on "per capita S&T-related budgets" and "the ratios of S&T-related budgets to fiscal outlays."

4. National Implementation and Nationwide Distribution of New R&D Organizations

Since the concept of a Technopolis was introduced, there were eight implementation projects being carried out by five government ministries and agencies to accelerate the regional development of R&D organizations. Regional initiatives augmented these [national] government projects, resulting in 81 R&D organizations in 37 prefectures that have been financed, invested in or operated directly by regional public organizations since 1984. These regional R&D organizations are characterized by being relatively small, possessing expensive measurement and testing instruments, or by hosting long-term foreign visitors.

5. Characteristics of Regional S&T Policies

The main objective of the S&T policies of regional governments is to provide technical guidance and support to regional small and medium businesses or to agriculture, forestry and fishery related enterprises.

Policy implementations with the goal of creating diverse S&T organizations by attracting, fostering or supporting R&D-type businesses are being carried out by 35 prefectures. Among them, 25 prefectures are internationalizing S&T enterprises by accepting researchers and trainees from overseas.

We could recognize an almost nationwide effort in fostering researchers and disseminating information on S&T. However, only about 40% of those questioned replied about the fostering of young researchers and fostering the understanding of S&T among regional residents.

6. Foundations and Third-Sector Research (Development Support) Organizations

There are a total of 121 foundations or third-sector research (development support) organizations financed or invested in by prefectural and designated city governments. Most of these organizations were established in the 1980s, and their total accumulated investments amount to ¥194.7 billion. Of this amount, the local governments' share is ¥67.7 billion, or 34.8%.

7. Joint Research Among "Local Governments"

The partners of joint research conducted by local governments are mostly private firms or other local governments, amounting to 471 cases for the former and 443 cases for the latter. Meanwhile, joint research projects with "universities" and "national research institutes" amount to merely 34 cases and 33 cases, respectively, even when we include cases in which three or more parties are involved, such as joint projects among "universities, private firms, and local governments."

Joint research projects involving public research institutions are those "arranged directly by researchers" rather than those arranged through a coordinating agency.

8. Characteristics of Public Research Institutions

Public research institutions were first established in the middle of the Meiji era [turn of the twentieth century], and more than one-half of them were improved before 1950. Institutes for agriculture, forestry and fishery were the earliest ones, followed by industrial institutes. After World War II, public health related institutes, such as the National Institute of Hygienic Sciences, were established, and environment related institutes, such as the National Institute of Environmental Studies, were established in the late 1960s.

The main characteristics of these research institutions are that about 60% of them are conducting research in agriculture, forestry and fishery, and almost 80% of them have less than 50 employees. Compared to national research institutes, only 16% of the public research institution employees hold a Master's degree or higher, but improvements in the academic background of their employees were visible. Foreigners worked in 8% of these institutions, and the foreigners stayed for less than a year. These research institutions tend to have fewer projects and smaller budgets, but about 70% of them were engaged in joint research projects.

Wide-ranging differences were observed among prefectures in "expensive measurement and testing instruments owned," "number of articles published," and "the average annual salary (for a 30-year old employee) of a researcher."

Variations were also observed in the ratio of three major types of work—research, technical consulting and guidance, and analyses and tests by request—among these public research institutions. A more detailed analysis is needed in the future on these points.

Since 1984, about one-third of the public research institutions have been improved and reorganized, including improvements and reorganizations in 30 prefectures in 1990 alone.

(Summary)

1. Systems To Promote S&T by Local Governments

To "promote regional S&T," many local governments must improve S&T promotion systems from two viewpoints—the establishment of a basic framework for policies, such as councils and basic guidelines, and the establishment of an organization in which administrative responsibilities are clearly assigned.

2. Determination of Appropriate Budget Levels by Local Governments and Examination of National Policy

It is necessary for each local government to determine an appropriate level for the S&T-related budget, taking into consideration its own industrial structure, policy goals, and [overall] budget. The central government also should examine its implementation of national S&T policy by considering S&T potentials, policy trends and the actual conditions of each region.

3. Examination of Long-Term Strategies and Implementation of Regional S&T Policies

An S&T policy to "create seeds [seed projects]" which emphasizes long-term strategies starting from basic research and reaching practical applications through applied research and development research, must be examined. It is also necessary to study actual methods of efficiently accelerating research exchange.

4. Examination of the Roles of Research Organizations in Supporting Regional S&T Activities

As reorganization proceeds, the objectives, formats, operation and management of over 600 public research institutions located throughout the country and of 121 research (development support) organizations that together possess nearly ¥200 billion in endowments and funds are being questioned.

5. International Contributions and Formation of International Networks by Public Research Institutions

In view of a century of accumulated history, the international role of public research institutions will become more important in the future in the form of international contributions mainly toward developing countries and the formation of international networks of worldwide research organizations with

the goal of promoting global S&T. It will also be necessary to improve the system to accept foreign researchers.

6. Discovering, Fostering and Securing Manpower To Promote Regional S&T

It is extremely important for the promotion of regional S&T to discover organizers who can initiate high-quality S&T seed projects, combine them with other sources of manpower, and nurture them into [full-scale] projects. It is also important to foster and secure researchers and technicians who can bear the major burden of S&T activities, particularly training and keeping young researchers, as well as fostering and securing administrators who can plan and establish S&T policies, an administrative area with few experienced people.

(Future Tasks)

1. Relations Between So-Called "Plan To Double Government R&D Investments" and S&T Budgets of Local Governments

Many activities are being discussed these days to increase the national investment in R&D. Most of these discussions, however, have focused on S&T-related budget of the central government, while attention has not been paid to S&T budgets of local governments. When we examine R&D investments by the central government, we should also discuss R&D investments by local governments, including complementary relations between the national and regional S&T policies.

2. Examination of Regional S&T Policies That Span Beyond Prefectures

Since economic and social activities cover a wide region, it is necessary to examine the methods of promoting S&T policies from a viewpoint that spans beyond prefectures, particularly to efficiently support regional S&T activities with a limited number of researchers, technicians, research facilities and limited funds.

3. Examination of Correlation between BPromotion of S&T" and "Regional Vitalization"

Up to now, there has not been sufficient discussions about "how to promote regional S&T, create and foster new industries and relate them to regional development." It will be necessary in the future to discuss how the promotion of S&T is related to regional vitalization, including the development of regional economies.

4. Examination of "Systematization of Regional S&T Policies" and "Regional S&T Indicators"

What policy goals and concepts should local governments adopt to "promote regional S&T?" Also to clarify items 1-3 above, a study on the "systematization of regional S&T policies" will be needed. As a follow-up to this survey, NISTEP will conduct a comprehensive survey study that will involve regional businesses, universities and other organization that will carry out S&T

activities but were not included in this study. The survey study will also examine "regional S&T indicators" as a means to evaluate the effectiveness of regional S&T policies.

5. Public Acceptance of Concept of "Promoting Regional S&T"

The present survey was conducted by interpreting "regions" as local governments, such as "metropolis and prefectures." Our survey shows that each local government has its own notion of "S&T." It is important for our future surveys that the concept of "promoting regional S&T" be widely accepted by the public as a more general concept.

1. Background and Objective

In the past, industrial policies of local governments were centered on the promotion of indigenous industries, and mostly concentrated on how to raise the technical level of indigenous industries and strengthen their competitiveness.

Also, from the viewpoint of increasing public service for local residents, local governments rarely had to tackle basic research, whose results did not immediately reward local residents, or research on topics without local potential.

However, with rapid changes both in economic society and in S&T in recent years, more local governments begin to realize that they must promote S&T built on basic research.

In the basic guidelines on S&T policy recently adopted by the cabinet, the "promotion of regional S&T" was taken up as one of the implementations to be emphasized by the central government.

Regional S&T activities are defined in the basic guidelines on S&T policy from two viewpoints. The first is to "contribute to the formation of a multicentral, distributed nation by serving as the prime mover for regional vitalization." The second is to "respond in detail to diverse regional needs and improve the quality of life of regional residents."

The former is mentioned even in the Fourth National Comprehensive Development Plan, which states that strengthening R&D function is a strategic task of regional vitalization. For instance, the Plan states that "the advancement of S&T is indispensable to the development of regional economies, and the promotion of S&T, which will serve as the prime mover, is very important for internally motivated development to achieve regionally independent development." The former viewpoint was based on this recognition.

On the other hand, the latter refers to diverse regional needs for S&T activities. These needs include technical needs of regional agricultural, forestry and fishery industries as well as small and medium businesses. In addition, as is indicated by the phrase "improve the quality of life of regional residents," the latter strongly relates to the promotion of S&T in the areas of public health and medicine and the living environment. In other words, "S&T should be promoted to solve regional problems, about which regional residents know best." The latter viewpoint was based on this recognition.

In addition, we begin to see a movement that regions themselves are aggressively taking lead and improving research facilities that serve as infrastructures, thus contributing to the improvement of S&T levels nationwide.

We describe here an overview of the "promotion of regional S&T" from the viewpoint of "regional vitalization," S&T, and "national facilities." Then, we describe the objective of this survey study as an "attempt to systematize 'regional S&T policies.'"

1.1 "Regional Vitalization" Viewpoint

We raise the following four points from the viewpoint of "regional vitalization":

First, regional promotion in the past has followed a formula of "from the central [government] to regions." Local governments played only a passive role of introducing developed technologies to indigenous industries. In recent years, however, with the rapid advancement in internationalization and data processing, regional capability in receiving and dispatching information has advanced and local governments began to have many channels to bring in [new] technologies.

Second, as the lifestyle of regional residents considerably changed due to an aging population and affluent living standard, it became necessary for local governments to lead in "invigorating regions."

An attempt to promote industries mainly by supporting or providing technical guidance to regional agricultural, forestry and fishery industries and to small and medium businesses as was done in the past has limitations in invigorating regional economies. It is now widely recognized that new regional promotion methods are needed, such as creating seedlings of S&T with the goal of "internally motivated development to achieve independent regional development."

Fourth, many regional residents began to recognize the fact that S&T have significantly contributed to Japan's economic development and have improved the national living standard.

1.2 "Science and Technology" Viewpoint

We raise the following three points from the viewpoint of S&T:

First, a mutual cooperation between basic, theoretical realm of science and applied, verifying realm of technology has become indispensable in advancing R&D nowadays. We begin to see science and technology approaching, resonating and fusing with each other.

Second, research efficiency took a giant step forward through the rapid advancement in research instruments, shortening the time needed for practical applications of research results.

Third, S&T diversified and became more interdisciplinary, exposing relative weaknesses in the handling by the central government in some areas.

1.3 "National Policy" Viewpoint

We identify the following five points from the viewpoint of "national implementation."

First, the necessity to create independent and harmonious regional societies was proposed in the concept of regional settlement zone included in the Third National Comprehensive Development Plan.

Second, the fostering of R&D functions as part of regional vitalization was identified as a strategic task in the concept of forming multicentral, distributed nation included in the Fourth National Comprehensive Development Plan.

The choices that regional governments have on what they can do to accelerate the strengthening of the foundation of regional society and accumulation of R&D functions have increased due to the enactment of the Law to Vitalize National Life [translation uncertain, *minkatsu-ho*], the Law to [establish] Intelligent Sites, and the Law to Accelerate the Formation of Multicentral, Distributed Nation.

Fourth, there are more national implementations that can be used to promote regional S&T, such as the Regional Flexible Research System funded by the S&T Promotion Adjustment Fund. At the same time, several local governments began their own undertakings to promote regional S&T.

Fifth, as the examples of regions pioneering in the promotion of S&T increase, there are more materials available to local governments when they discuss methods to promote S&T.

With these changes associated with economic society and S&T, local governments recently have begun to realize that S&T is the prime mover in the development of regional economies, and their activities for promoting S&T have become more vigorous.

1.4 Attempt To Systematize "Regional S&T Policies"

In the past, the central government supported research projects that did not easily lead to visible investment returns or those that took long time to use research results in practical applications, or projects that required a huge sum of money and concentration of a large number of research staff.

Recently, however, some local governments have established organizations that support basic research, making it difficult to clearly distinguish the roles of the central and local governments for each research area or step.

Such a move by local governments implies that we should review the "division of roles between the central and local governments" in S&T policy. Also from the viewpoint of improving the national S&T level, these actions by local governments indicate that it is urgent to propose a new system for promoting S&T through mutual cooperation of the central and local governments.

In doing so, the central government should examine what attitude to take in "promoting regional S&T" and actually what should be done to "aggressively support individual and leading actions by local governments" as was spelled out in the basic guidelines for S&T policy.

To answer these questions, we must first find out "what kind of regional activities are popular now."

Of course, the organizations that "promote regional S&T" are not limited to local governments; universities, private businesses and the central government also play important roles. However, from the viewpoint of implementing comprehensive, regional S&T policies, the first thing we must do is to understand the current status of implementations by local governments.

For these reasons, we have conducted a comprehensive survey study on the systems and implementations for promoting S&T by local governments, mostly centered on metropolis, prefectures and designated cities.

As a result, we were able to identify the current status for the first time in the form of "analysis of S&T policies of prefectures and designated cities."

This study contributes to the systematization of S&T promotion and adoption of new S&T policies by local governments, and also provides basic data needed by the central government in implementing support measures for the promotion of S&T by local governments.

2. Survey Content and Method (Overview)

Before this status survey was conducted, we had adopted a hypothesis on "regional S&T policies" to collect wide-ranging and accurate data as much as possible.

This hypothesis is as follows: "If we assume that S&T has two sides, economy and contribution to social life, a paradigm of S&T policies can be shown in terms of a two-dimensional space that can be identified by two axes representing economy and human life. The third dimension represents internationalization."

This hypothesis was presented by Kinji Gonda, a supervising principal researcher of NISTEP, at the Third International Conference on S&T Policy Studies (hosted by NISTEP of STA on 9-11 March 1992) under the title of "Framework of Industrial Location Policy and Roles of Regional S&T Policy in Japan."

We have carried out our status survey based on this framework. The topics surveyed can be divided into the following five categories.

- (1) Status survey of comprehensive activities in S&T policies led by local governments;
- (2) Status survey of S&T budgets of local governments;
- (3) Status survey of the formation of diverse research consortia;
- (4) Status survey of research activities by public research institutions; and
- (5) Identification of newly established regional R&D organizations and status survey of research activities of these new R&D organizations.

In Yamagata, Iwate, Miyagi, Shizuoka, Toyama and Ishikawa Prefectures, we also held survey hearings at the prefectural offices, research institutions and research support organizations.

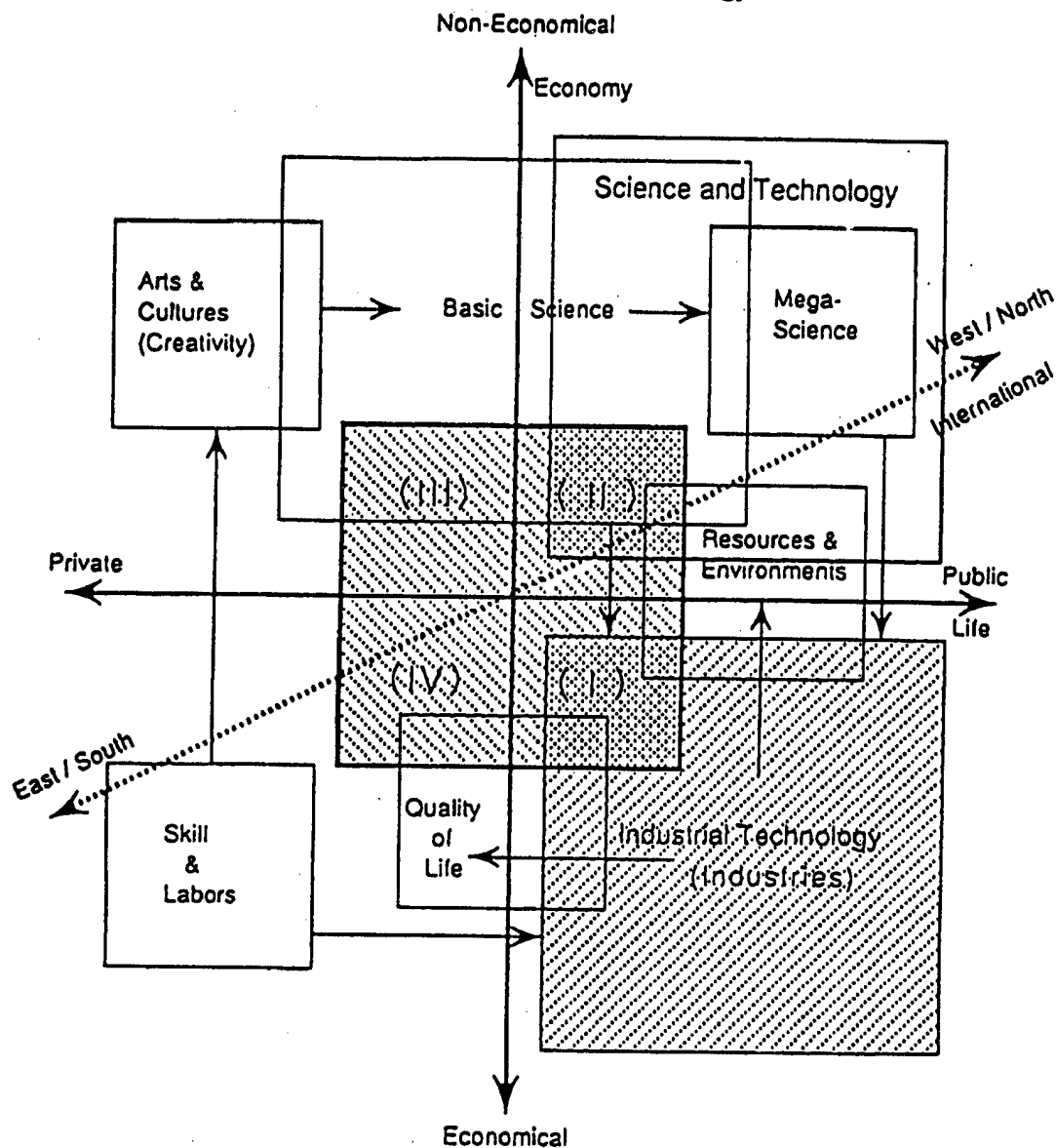
An overview of our status survey is given below.

2.1 Status Survey of Handling of Comprehensive S&T Policies Initiated by Local Governments

At the Regional S&T Policy Conferences (the first in July 1991, the second in April 1992), we have distributed an "overview of S&T activities by local governments (STA)" and collected data related to prefectural ordinances establishing S&T-related councils, guidelines for establishing them, and basic guidelines for S&T policies. We also listened to arguments presented at these conferences.

These conferences were held with the objective of further promoting both regional and national S&T from the viewpoint of S&T policies by coordinating the activities of the Council for Science and Technology, which is the highest council of the central government for Japan's S&T policy, and S&T-related councils established in each prefecture.

Participants of these conferences were chairmen of S&T-related councils of Hokkaido, Yamagata, Saitama, Kanagawa, Toyama, Ishikawa, Yamanashi, Shizuoka, Kyoto, Osaka, Hyogo and Yamaguchi Prefectures, and the members and policy councilors of the Council for Science and Technology.



(I) , (II) , (III) , (IV) : Regional Science and Technology Policy

Figure 2.1.1 Criteria of Science and Technology Policies

2.2 Status Survey of S&T-Related Budgets of Prefectures and Designated Cities

In the name of the NISTEP director, we have asked cooperation of 47 prefectural governors and 11 mayors of designated cities (Sapporo, Sendai, Yokohama, Kawasaki, Nagoya, Kyoto, Osaka, Kobe, Hiroshima, Kitakyushu and Fukuoka; Chiba was left out) in our survey of S&T-related budget (see appended references). A total of 45 prefectures and seven cities replied to our request. (We have not received replies by our deadline from Tokyo Metropolis, Nagasaki Prefecture, Sapporo, Yokohama, Nagoya and Fukuoka).

Our survey questionnaires were sent to bureaus in charge of S&T policies in prefectures and planning bureaus in designated cities.

The survey questionnaires contained a total of 24 questions. The questions were classified into the following eight categories:

- (1) Establishment and operation of public research institutions and universities (within administrative framework);
- (2) Establishment and operation of foundations and third-sector [support] organizations;
- (3) Implementation of guidelines, support and incentives to bring in [S&T organizations];
- (4) Implementation of network formation such as research exchange programs;
- (5) Implementation of international exchange;
- (6) Implementation of manpower training;
- (7) Development of comprehensive implementation; and
- (8) Implementation of public relations and education;

2.3 Status Survey of Diverse Research Consortia Formation

In our survey, we formed a 4 by 4 matrix that consists of universities, national research institutes, local governments and the private sector. In each of the matrix columns, we have recorded the following four distinct survey results, and completed the matrix by computing the sum of each column.

The following four distinct survey results were tabulated:

- (1) Joint research carried out by national research institutes;
- (2) Joint research carried out by national universities;
- (3) Joint research carried out by public research institutions; and
- (4) Joint research carried out among private enterprises.

2.4 Status Survey of Research Activities by Public Research Institutions

This survey was conducted between January and February 1992 by using a "Questionnaire on the 'Survey of Effective Use of Regional Resources in Promoting Regional S&T'" (see appended references [not published]).

We have surveyed all public research institutions (628 institutions) that have been selected from "National Roster of Research Institutions" (supervised by STA, published by Lattice). Of these, 472 institutions, or 75%, replied. The actual survey was conducted by the "Association of S&T and Economy."

There are a total of 28 questions in the questionnaire. The result of the survey is summarized in seven categories as follows:

- (1) Employee structure;
- (2) Age structure;
- (3) Educational history structure, number of employees holding doctorate;
- (4) Organization, remuneration of researchers;
- (5) Measurement and testing instruments installed;
- (6) R&D, technical guidance and consultation, analysis and tests requested; and
- (7) Joint research.

2.5 Identification of Newly Established Regional R&D Organizations and Status Survey of Research Activities of Such Organizations

(1) Identification of Newly Established Regional R&D Organizations

We first collected published data and data from government ministries, and conducted hearing surveys from officials. Then, we have confirmed our data on the new regional R&D organizations through officials of local governments, and collected data on the R&D organizations.

Major published data sources from which we have collected are as follows:

- 1) Industrial S&T Vision of the 1990s ([published in] August 1990), edited by the Agency of Industrial Science and Technology [AIST], MITI;
- 2) The Japan Key Technology Center, 1985 through 1990 (January 1991), by the Japan Key Technology Center;
- 3) R&D That Cover Diverse Fields--Projects Funded by Bio-Oriented Technology Research Advancement Institution [BOTRAI], by BOTRAI;

4) Overview of Research Promotion Projects, by Funds to Promote Recovery from and Research on Side-Effects of Medicine;

5) Survey Study Report on the Direction of Regional Creative Manpower Training (March 1990), by the Comprehensive Center for Home Rule.

(2) Status Survey of Research Activities of Regional R&D Organizations

We conducted a "questionnaire survey on 'Effective use of regional resources to promote regional S&T'" (see appended references [not published]) between February and March, 1992. Organizations surveyed include R&D organizations identified through 2.5 (1) above (94 organizations). Of these, 48 organizations replied, a return rate of 51%.

The actual survey was consigned to the Association of S&T and Economy.

The questionnaire contained a total of 25 questions. The survey results were summarized into the following six categories.

- 1) Employee structure;
- 2) Age structure;
- 3) Educational history structure, number of employees holding doctorate;
- 4) Remuneration of researchers;
- 5) Measurement and testing instruments installed;
- 6) Joint research.

When it was necessary to explain the objective, content and method of our survey in more detail, we have included them in each chapter presented below.

3. Comprehensive Promotion of S&T Policies Initiated by Local Governments

Reply No. 11 of the Council for Science and Technology (November 1986) and the Fourth National Comprehensive Development Plan (adopted by the cabinet in June 1987) have identified the role of strengthening regional R&D functions as a strategic task for regional vitalization. With this background, the number of local governments that try to achieve regional promotion through advanced R&D functions has increased lately.

Also in the Basic Guidelines for S&T Policy (April 1992), the promotion of regional S&T is adopted as an important implementation of the government policy.

Under these circumstances, Kanagawa, Toyama and Hyogo Prefectures have hosted councils and conferences to discuss promotion of S&T. Moreover, Kanagawa, Saitama and Iwate Prefectures have adopted their own basic guidelines for S&T policies, initiating comprehensive promotion of S&T policies.

We summarize here the activities initiated by local governments for the implementation of comprehensive S&T policies, with an emphasis on the establishment of S&T-related councils and the adoption of basic guidelines for S&T policies (Table 3-1-1).

3.1 Establishment of S&T-Related Councils

Recently the number of prefectures that are establishing S&T Councils composed of knowledgeable people to examine regional S&T promotion policies has increased.

At present, 11 prefectures have active S&T councils, in Hokkaido, Iwate, Kanagawa, Toyama, Ishikawa, Yamanashi, Kyoto, Osaka, Hyogo, Hiroshima and Yamaguchi Prefectures.

These S&T councils, however, are given different roles in their prefectural administrative structures. For instance, the "Hokkaido S&T Council" has been established as a consulting council for the prefectural governor in accordance with the Ordinance for the Hokkaido S&T Council. Each year, the council will 1) select research topics to award Hokkaido scientific research grants, 2) recognize inventions connected with official duties, and 3) select candidates for the Hokkaido S&T awards. In addition, the council can offer its advice to the governor. On the other hand, the "Kanagawa Prefectural S&T Council" has been established in accordance with the Guidance for Establishing Kanagawa Prefectural S&T Council. This council discusses 1) matters concerning basic and comprehensive S&T policies, 2) important R&D to be conducted by the prefecture, and 3) vitalization of prefectural research institutions. The council will advise the governor as needed. Iwate Prefecture has established the "Iwate Prefectural S&T Promotion Council," as an organization that connects bureaus of the prefectural government horizontally and assist them in planning and coordinating. The council members consist of the governor, deputy governor, and representatives of various S&T-related bureaus of the prefecture.

Meanwhile, some fixed-term organizations to adopt basic guidelines for S&T policies, such as the "Shizuoka Prefectural S&T Promotion Conference" (March 1987-March 1991) and the "Saitama Prefectural S&T Forum" (September 1988-March 1990), have already achieved their objectives and have been disbanded.

Some prefectures, such as Yamagata and Fukuoka Prefectures, did not establish any S&T councils, but they are taking advantage of regional S&T promotion activities of the central government in their prefectures, while they are also promoting S&T through unique and aggressive measures of their own.

There are only three local governments that have established administrative sections dedicated to S&T policies and with titles that include the phrase S&T—Hokkaido, Saitama and Kanagawa Prefectures.

3.2 Adoption of Basic Guidelines for S&T Policies

An increasing number of local governments have adopted basic guidelines for S&T policies, after discussions by the S&T-related councils mentioned above, with the goal of clarifying the role of S&T policies in their prefectural administration.

At present, nine prefectures—Hokkaido, Iwate, Saitama, Kanagawa, Toyama, Yamanashi, Shizuoka, Osaka and Hyogo Prefectures—have adopted basic guidelines for S&T policies. Discussions are under way in Yamaguchi and Kagoshima Prefectures.

Some differences are seen in these guidelines for S&T policies according to existing industrial sites and research potential of [existing] universities and public research institutions. These guidelines emphasize 1) the improvement of the life of regional population, and 2) the advancement of regional industries. In addition, in regions with high, existing research potentials, the goals also include 3) accumulation and expansion of scientific knowledge, and 4) internationalization and contribution to the international society.

For aggressively implementing these policies, the guidelines urge 1) improving R&D infrastructures such as public research institutions and S&T support systems, 2) enhancing S&T education, fostering and settling of young researchers and specialists, 3) promoting international cooperations such as a wide-ranging S&T cooperation, 4) more open S&T policy development such as providing S&T information to regional residents and strengthening public education and dissemination of information, and 5) strengthening systems to promote regional S&T policies by strengthening comprehensive coordinating functions within each prefectural administrative structure.

Table 3-1-1. List of S&T Policy Council and S&T Guidelines by Prefectures

3-1-1a:

Prefecture	Hokkaido
S&T-related council	
Council title	Hokkaido S&T Council
Date established	September 1952
Legal authority for establishing council	Ordinance to establish Hokkaido S&T Council
Council chairman	Toichiro Koike (President, Dohoto University)
Council members	30 experts from industries, academia and government
Assignment to the council	<p>When requested by the governor, the council will discuss the following and report to the governor:</p> <ul style="list-style-type: none"> • Actions necessary to reflect S&T to the prefectural administration • Promotion and dissemination of S&T • Actions necessary to coordinate matters concerning S&T • Assisting S&T organisations • Encouraging and assisting general research on S&T • Inventions in connection with official duties • Coordination with S&T Administration Council and Science Council of Japan • Other matters deemed necessary to promote S&T
Basic guidelines for S&T policy	Basic policies for promoting S&T in Hokkaido
Date guidelines adopted	April 1991
Basic policy direction	<ul style="list-style-type: none"> • Vitalize industry • Improve the living environment • Promote internationalisation • Implement comprehensive and horizontally connected S&T promotion • Foster creative manpower
Proposed implementation plan	<ul style="list-style-type: none"> • Strengthen R&D functions by vitalizing prefectural research institutions • Promote research exchange by encouraging joint research • Expand education and training to foster creative manpower • Establish systems to promote R&D such as a framework for cooperation among industries, academia and government • Improve research foundation such as research-oriented infrastructures • Promote international exchange technological cooperation with overseas institutions • Utilize S&T information such as by forming S&T data networks • Strengthen S&T education through dissemination and public education
Office in charge of implementation	Coordination Section, Planning and Promotion Division

Table 3-1-1b:

Prefecture	Iwate Prefecture
S&T-related council	
Council title	Iwate Prefecture Council To Promote S&T
Date established	April 1989
Legal authority for establishing council	Ordinance To Establish Iwate Prefecture Council To Promote S&T
Council chairman	Iwao Kudo (governor of Iwate Prefecture)
Council members	16 members including the governor, deputy governor, and other prefectural division and bureau chiefs
Assignment to the council	<ul style="list-style-type: none"> • Comprehensive and long-term planning and promotion of measures to promote S&T • Coordination of measures to promote S&T
Basic guidelines for S&T policy	Guidelines for the promotion of S&T in Iwate Prefecture
Date guidelines adopted	May 1990
Basic policy direction	<ul style="list-style-type: none"> • Create new infrastructures to promote S&T, such as creating R&D bases and improving R&D support facilities • Consolidate existing R&D infrastructures such as research facilities operated by universities, the central government, the prefecture and the private sector • Promote research exchange to respond to research topics that cover advanced research areas or multiple fields • Training and securing researchers and technicians to accumulate advanced R&D functions • Accelerated use of R&D results for commercialization, dissemination and anchoring of such results
Proposed implementation plan	<ul style="list-style-type: none"> • Create R&D infrastructures by inviting and establishing innovative R&D companies and research institutions • Improve R&D support facilities such as research exchange facilities and joint research facilities • Concept of areas with concentrated academic research functions that have integrated facilities for academic research, exchange, housing, education, cultural activities and sports
Office in charge of implementation	Planning and Coordination Section, Planning and Coordination Division

Table 3-1-1c:

Prefecture	Saitama Prefecture
S&T-related council	
Council title	Saitama S&T Forum
Date established	September 1988 (abolished in March 1990)
Legal authority for establishing council	Ordinance To Establish Saitama S&T Forum
Council chairman	Masayuki Takeuchi (president, Saitama University)
Council members	10 experts from the central government and private research institutes, universities
Assignment to the council	<p>To contribute to the formation of a vital, creative and ready society for the 21st century, the Forum will discuss and propose basic directions of Saitama Prefecture's comprehensive S&T policies.</p> <ul style="list-style-type: none"> • Comprehensive promotion of S&T policies • Vitalization of research institutions and their future roles • Fostering of an environment friendly to S&T
Basic guidelines for S&T policy	S&T policies for Saitama Prefecture poised for the next century
Date guidelines adopted	February 1990
Basic policy direction	<ul style="list-style-type: none"> • Train youth rich in imagination to carry on S&T in the 21st century • Promote exchange of researchers and information and strengthen R&D activities further • Accumulate high-technology industries and vitalize regional economy by introducing advanced S&T to indigenous industries • Foster regional environment suitable for internationalization
Proposed implementation plan	<ul style="list-style-type: none"> • Appoint model S&T schools; strengthen engineering and agricultural high schools; install linear motor car tracks to provide a riding experience; enlighten primary and middle school students about S&T; and accelerate exchange of researchers • Train high-technology technicians; assist R&D projects; strengthen refresher courses for researchers; construct high-technology exhibition halls; improve incubators; foster venture enterprises; improve R&D-oriented industrial parks; promote research consultant systems; foster science cities; hold international conferences; and accelerate exchanges with foreign researchers and technicians
Office in charge of implementation	S&T officer, Planning and Administration Section, Planning and Finance Division

Table 3-1-1d:

Prefecture	Kanagawa Prefecture
S&T-related council	
Council title	Kanagawa Prefecture S&T Council
Date established	June 1988
Legal authority for establishing council	Ordinance to Establish Kanagawa Prefecture S&T Council
Council chairman	Shinroku Saito (Professor emeritus, Tokyo Institute of Technology)
Council members	15 experts from industry, academia and government
Assignment to the council	<p>The council discusses the following items and advises the governor as needed</p> <ul style="list-style-type: none"> • Basic and comprehensive policies concerning S&T • Important R&D conducted by the prefecture • Vitalization of prefectural research institutions
Basic guidelines for S&T policy	Basic guidelines for S&T policies of Kanagawa Prefecture
Date guidelines adopted	March 1990
Basic policy direction	<ul style="list-style-type: none"> • Promote S&T to improve the quality of life • Promote S&T to advance regional industries • Contribute to the creation and advance of knowledge to improve the welfare of mankind
Proposed implementation plan	<ul style="list-style-type: none"> • Improve infrastructures for S&T promotion <ul style="list-style-type: none"> Improve R&D infrastructures Train and settle creative manpower Promote international cooperation Promote open S&T policies • S&T areas to be emphasized <ul style="list-style-type: none"> Promote S&T related to humanity and society Promote S&T related to industry Promote creative S&T
Office in charge of implementation	S&T Policy Section, Planning Division

Table 3-1-1e:

Prefecture	Toyama Prefecture
S&T-related council	
Council title	Toyama Prefecture S&T Council
Date established	November 1983
Legal authority for establishing council	Ordinance to Establish Toyama Prefecture S&T Council
Council chairman	Tomomichi Yanagita (Professor emeritus, Tokyo University)
Council members	20 experts from industry and academia in Toyama Prefecture
Assignment to the council	<ul style="list-style-type: none"> • Proposal for the direction of S&T policy and promotion in the prefecture • Foster an environment friendly to S&T • Examine measures to establish comprehensive and flexible connections among regional research institutions • Offer opinions on S&T-related measures to the central government
Basic guidelines for S&T policy	S&T plan of Toyama Prefecture
Date guidelines adopted	October 1991
Basic policy direction	<p>As "important viewpoints [for building] Toyama as a base for intelligent manpower":</p> <ul style="list-style-type: none"> • Promote S&T that contribute to affluent life • Promote S&T unique to Toyama • Promote S&T that will contribute to the international society
Proposed implementation plan	<ul style="list-style-type: none"> • Train manpower that challenges frontiers Establish museums; hold symposia and shows; publish position papers on S&T; construct a museum of the future for children; establish graduate schools in the prefectural universities; strengthen the Foundation to Promote Advanced Education; strengthen human resource banks • Build a foundation to promote S&T Improve and strengthen prefectural research institutions, invite private research institutions; form a concentrated base of research organizations; and improve facilities for exchange • Establish systems that create new S&T Accelerate joint research among industries, academia and government; promote research projects to study mobility within the prefecture; participate and invite large projects supported by the central government; strengthen functions to coordinate research projects; expand opportunities for international exchange; build R&D infrastructures to study the Sea of Japan; strengthen support functions for enterprisers; establish information system
Office in charge of implementation	Planning and Coordination Section, Prefectural Affairs Planning Division

FOR OFFICIAL USE ONLY

Table 3-1-1f:

Prefecture	Ishikawa Prefecture
S&T-related council	
Council title	Ishikawa Prefecture S&T Promotion Council
Date established	August 1982
Legal authority for establishing council	Ordinance to Establish Ishikawa Prefecture S&T Promotion Council
Council chairman	Takeshi Yasui (Professor, Kanazawa University)
Council members	20 experts from industry, academia and government
Assignment to the council	Promote industrial technology in Ishikawa prefecture <ul style="list-style-type: none"> • Propose measures necessary to promote technology • Indicate agenda for discussion by committees and examination of reports by the committees • Other promotion of technology
Basic guidelines for S&T policy	Earnestly strengthen brain power of the prefecture
Date guidelines adopted	
Basic policy direction	<ul style="list-style-type: none"> • Expand sites for advanced industries and laboratories; foster future industries • Promote advanced mechatronics (mechanics and electronics) into the machine industry • Convert the [indigenous] textile industry into a diverse, comprehensive one • Expand high-technology parks and form industrial data networks
Proposed implementation plan	<ul style="list-style-type: none"> • Adopt modernization plans for industrial research institutes • Establish a Creative Brain Group system (introduce a guest researcher system) • Establish Advanced Materials Development Laboratory and Electronic Technology Laboratory • Propose the establishment of the Ishikawa Trial Center • Propose a new, Food Processing Experimental Building
Office in charge of implementation	Ishikawa Prefecture Industrial Research Institute

Table 3-1-1g:

Prefecture	Yamanashi Prefecture
S&T-related council	
Council title	Yamanashi Prefecture S&T Council
Date established	October 1991
Legal authority	Ordinance to Establish Yamanashi Prefecture S&T Council
Council chairman	Satoru Omura (Director, Kitasato Institute)
Council members	15 experts
Assignment to the council	Propose and advice the governor on the basic direction for promoting S&T in Yamanashi Prefecture and on other matters concerning S&T
Basic guidelines	Basic outline of S&T policy of Yamanashi Prefecture
Date guidelines adopted	March 1992
Basic policy direction	<ul style="list-style-type: none"> • Realize a cultural environment rich in creativity • Realize affluent life for the prefecture residents • Realize a pleasant prefectural environment with harmony between nature and residents • Realize a unique industrial structure • Promote international exchange and cooperation
Proposed implementation plan	<ul style="list-style-type: none"> • Develop regional scientific activities • Establish participation and hands-on experience learning facilities • Improve central base for educational research, facilities for exchange • Establish academy to serve as a club-like organization for researchers
Office in charge	Planning Section, Prefectural Affairs Planning Bureau

Table 3-1-1h:

Prefecture	Shizuoka Prefecture
S&T-related council	
Council title	Shizuoka Prefecture S&T Promotion Council
Date established	March 1987 (abolished in May 1991)
Legal authority	Ordinance to Establish Shizuoka Prefecture S&T Promotion Council
Council chairman	Torazo Hosoi (Professor, Shizuoka University)
Council members	15 experts from industry and academia
Assignment to the council	<p>The following was discussed and council has submitted a proposal and report to the governor about measures to promote S&T rich in creativity:</p> <ul style="list-style-type: none"> • "Create a path to the 21st century with the goal of building abundant spirit and lively society"
Basic guidelines	Basic direction for promoting S&T in Shizuoka Prefecture
Date guidelines adopted	January 1990
Basic policy direction	<ul style="list-style-type: none"> • Build infrastructures to promote S&T • Utilize the electronics industry to vitalize industry • Build information networks to provide advanced R&D functions
Proposed implementation plan	<ul style="list-style-type: none"> • Establish the Foundation to Promote S&T in Shizuoka Prefecture • Establish a network to accelerate advanced R&D
Office in charge	Industrial Site Technology Section, Commerce, Industry and Labor Division

Table 3-1-1i:

Prefecture	Kyoto Prefecture
S&T-related council	
Council title	Kyoto Prefecture S&T Council
Date established	September 1961
Legal authority for establishing council	Ordinance to Establish Institutions Attached to Kyoto Prefecture
Council chairman	
Council members	15 knowledgeable and experienced persons
Assignment to the council	Survey and study promotion of S&T; examine measures to promote S&T
Basic guidelines for S&T policy	(No specific goals)
Date guidelines adopted	
Basic policy direction	<ul style="list-style-type: none"> • Establish cultural and academic research infrastructures • Promote exchange among industry, academia and government
Proposed implementation plan	<ul style="list-style-type: none"> • Establish Funds to Promote Industrial Technology in Kyoto (tentative title) • Examine [the establishment of] facilities to be used jointly by industry, academia and government
Office in charge of implementation	Commerce and Industry Promotion Section, Commerce and Industry Division

Table 3-1-1j:

Prefecture	Osaka Prefecture
S&T-related council	
Council title	Osaka Prefecture S&T Forum
Date established	December 1986
Legal authority for establishing council	Ordinance to Establish Osaka Prefecture S&T Forum
Council chairman	
Council members	7 experts from industry, academia and government
Assignment to the council	Propose to the governor directions for S&T promotion
Basic guidelines for S&T policy	Basic guidelines for R&D in Osaka Prefecture
Date guidelines adopted	1986
Basic policy direction	<ul style="list-style-type: none"> • Contribute to regional vitalization • Contribute to improved life for prefectural residents • Contribute to internationalization
Proposed implementation plan	<ul style="list-style-type: none"> • Role of the prefecture to comprehensively demonstrate R&D capability • Vitalize prefectural research institutions
Office in charge of implementation	Commerce and Industry Promotion Section, Technology Promotion Division

Table 3-1-1k:

Prefecture	Hyogo Prefecture
S&T-related council	
Council title	Hyogo Prefecture S&T Council
Date established	July 1986
Legal authority	Ordinance to Establish Hyogo Prefecture S&T Council
Council chairman	Nobuaki Kumagai (Professor Emeritus, Osaka University)
Council members	21 experts from industry, academia and government
Assignment to the council	Propose the following to the governor: <ul style="list-style-type: none"> • Basic direction for and comprehensive promotion of S&T • Identify needs of S&T and seed projects • Other matters concerning S&T promotion
Basic guidelines	Basic guidelines for R&D in Hyogo Prefecture
Date guidelines adopted	
Basic policy direction	<ul style="list-style-type: none"> • Improve life of prefectural residents and vitalize regional economy • Emphasize basic research that highlights regional advantages • Develop comprehensive S&T policy
Proposed implementation plan	<ul style="list-style-type: none"> • Improve infrastructures for S&T promotion • Establish research organizations to serve as foundation • Expand and improve prefectural research institutions • Promote networking with international society • Foster and settle creative manpower
Office in charge	(S&T officer), Planning Councilor, Planning Division

Table 3-1-11:

Prefecture	Hiroshima Prefecture
S&T-related council	
Council title	Hiroshima Prefecture S&T Council
Date established	June 1982
Legal authority	Ordinance to Establish Hiroshima Prefecture S&T Council
Council chairman	Norimoto Yoshida (Assistant to the President of Hiroshima University)
Council members	17 persons from industry, academia and government
Assignment to the council	Discuss and propose the following to the governor: <ul style="list-style-type: none"> • Basic direction for promoting S&T • Measures to promote S&T • Other matters concerning S&T promotion
Basic guidelines for S&T policy	Adopt "Basic direction for promoting S&T in Hiroshima Prefecture (tentative title)"
Date guidelines adopted	
Basic policy direction	
Proposed implementation plan	
Office in charge of implementation	Industrial Technology Section, Commerce, Industry and Labor Division

Table 3-1-lm:

Prefecture	Yamaguchi Prefecture
S&T-related council	
Council title	Yamaguchi Prefecture S&T Promotion Council
Date established	May 1991
Legal authority for establishing council	Ordinance to Establish Yamaguchi Prefecture S&T Promotion Council
Council chairman	Ryohei Tanaka (Professor Emeritus, Tokyo Institute of Technology)
Council members	12 persons from industry, academia and government
Assignment to the council	Propose the following to the governor: <ul style="list-style-type: none"> • Basic and comprehensive policy for promoting S&T • Vitalize prefectural research institutions • Other matters concerning S&T promotion
Basic guidelines for S&T policy	Adopt "Basic guidelines for promoting S&T in Yamaguchi Prefecture (tentative title)"
Date guidelines adopted	
Basic policy direction	
Proposed implementation plan	
Office in charge of implementation	Industrial Promotion Section, Commerce, Industry and Labor Division

Source: Excerpts from "Summary of S&T Activities in Prefectures" (The Second Meeting on S&T Policies of Local Governments)

4. Comparison of Regional S&T-Related Budgets

In this chapter, we compare regional S&T-related budgets of local governments based on a survey conducted in January 1992. (Here, "regional S&T-related budgets mean S&T-related budgets of local governments included in our survey. Budgets in other sectors, such as cities other than designated cities, private firms and the central government, are excluded.)

First, we present an overview of the total S&T-related budgets of local governments and their details (by administrative units, survey categories, and by public research institutions), and then we compare the budgets mainly among prefectures.

4.1 Regional S&T-Related Budgets

(1) Total Regional S&T-Related Budgets

Twenty-four S&T-related questions were asked (Table 4-1-4) to survey the FY1990 budgets of local governments. The total S&T-related budgets of 45 prefectures and seven designated cities¹ amounts to approximately ¥492.4 billion. The average budget per prefecture is about ¥10 billion, while that per city is about ¥5.9 billion (Table 4-1-1).

Table 4-1-1 S&T Budget of Local Governments

(FY1990, ¥ million)

	Responding prefectures	Responding specified cities*	Total
S&T budget	451,392	40,963	492,355
Average	10,031	5,852	

*Cities which have higher governability than ordinary cities, designated by a government ordinance.

As described later in Section 4.2, there is correlation between "regular budgets"² of local governments and their financial outlays, the number of researchers, populations and prefectural gross products (correlation coefficients between 0.722~0.678). Hence, we used these four parameters to

¹ Tokyo Metropolis and Nagasaki Prefecture did not respond to our survey, nor the designated cities of Sapporo, Yokohama, Nagoya and Fukuoka.

² "Regular budgets" were calculated from S&T-related budgets after subtracting "budget for reorganizing and improving public research institutions," which widely fluctuated from year to year, and "budget for public institutions of higher education," which also varied widely depending on whether a local government had such institutions or not.

estimate the total S&T-related budget of local governments for FY1990.³ This estimated total is approximately ¥573.2 billion.

The national total S&T-related budget calculated from a summary provided by STA for FY1990 is about ¥2.1407 trillion.⁴ The sum of local governments' budgets amounts to 26.7 percent of the national total.

Also, research funds provided by the national and local governments are surveyed in the report by the Statistics Bureau as the source of payment for R&D expenditures. According to this report (1991), the total research funds paid by the national and local governments in FY1990 was about ¥1.9901 trillion (natural sciences only), including about ¥1.6438 trillion or 82.6 percent by the national government and about ¥346.4 billion or 17.4 percent⁵ by local governments.

In Figure 4-1-1, we illustrate the relation among "S&T-related budgets" of local governments, the national "S&T-related budget," "total R&D expenditures" of the national and local governments included in the Statistics Bureau report

³ The method used for estimating the total budget is as follows:

(a) The amount of "regular budgets" for the two prefectures that did not reply was calculated by using linear regression of each of the four parameters—financial outlays, the number of researchers, population and prefectural gross product. (Four different values were obtained.)

(b) The amount of "budgets other than regular budgets" for the two prefectures that did not reply was substituted by a simple average of 45 prefectures that replied.

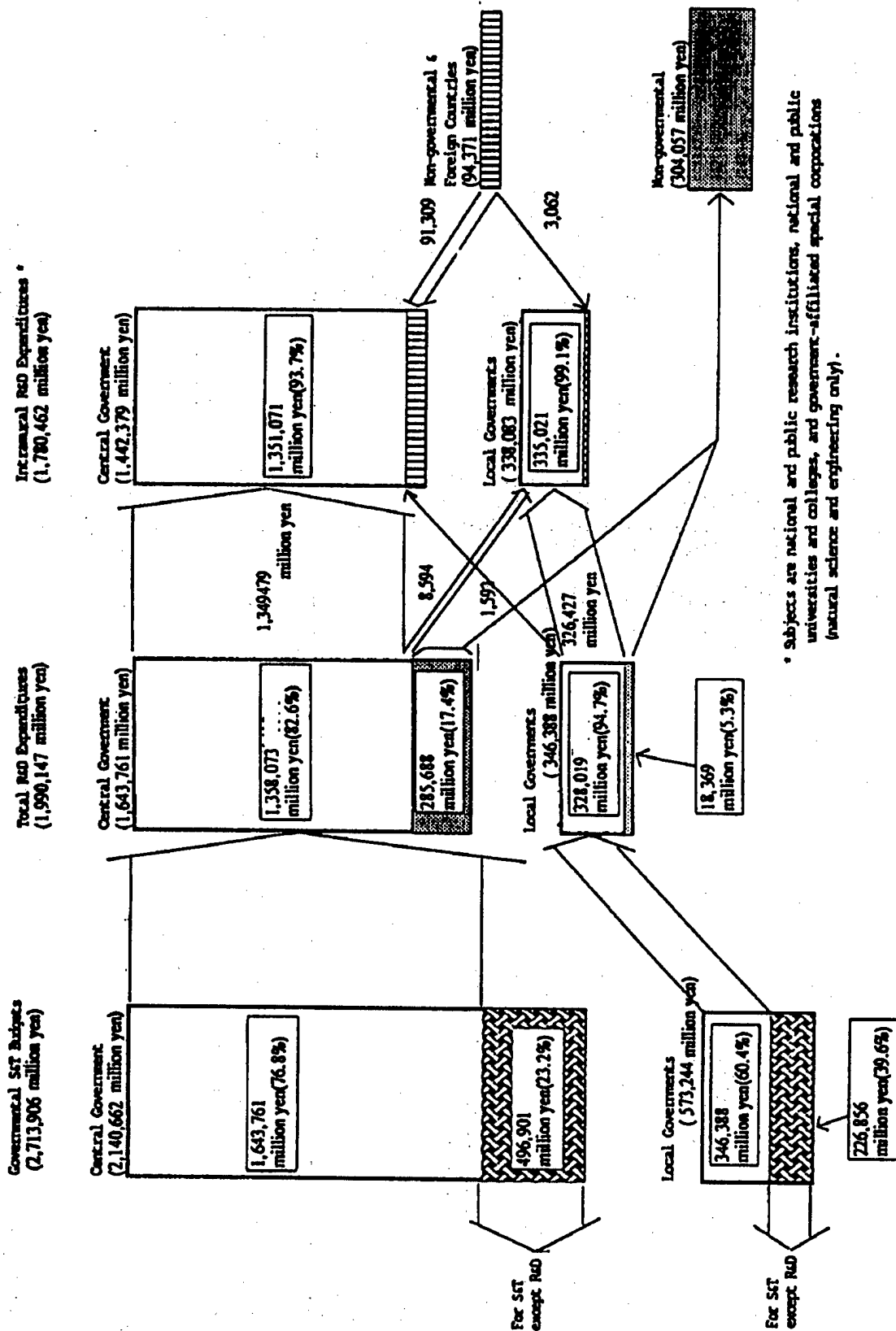
(c) No correlation was found between the S&T-related budgets of designated cities and their financial outlays, population, annual shipping of industrial products or taxed income. Hence, the total budget for all designated cities was taken to be 11/7 of the total S&T-related budgets of the cities that replied.

(d) A simple average of the sum of S&T-related budgets calculated by the above methods (four values) is used as the estimated S&T-related budget of prefectures and designated cities.

⁴ Only 50 percent of university payroll is included in the "National S&T-Related Budget (Proposal by STA)" (¥1.9209 trillion in FY1990) contained in the S&T White Paper. In order to be compatible with this survey and an "S&T R&D Survey" [report] issued by the Statistics Bureau of the Management and Coordination Agency referred to later, we have added 50 percent of payroll calculated from the said report and used the sum as the total national S&T-related budget.

⁵ The "S&T R&D Survey" report, issued by the Statistics Bureau of the Management and Coordination Agency, includes R&D budgets received from and paid to outsiders, such as "national and public universities" and "national and public research institutions," which cannot be divided clearly into the national and local governments. Such entries were prorated using appropriate "internal R&D expenditures" (e.g., internal R&D budgets of national universities and public universities).

Figure 4-1-1 S&T Budgets and R&D Expenditures (Central and Local Governments, FY1990)



* Subjects are national and public research institutions, national and public universities and colleges, and government-affiliated special corporations (natural science and engineering only).

and "internal R&D expenditures." The left column of the figure shows "S&T-related budgets," of which the central government used 76.8 percent for R&D expenditures and local governments spent 60.4 percent likewise. The rest was used for activities other than R&D, such as international cooperation, international exchange projects, public relations projects, projects to invite and foster R&D-type enterprises, various subsidies, and general administration expenses. Of the R&D expenditures, the shares of internal R&D expenditures by the central and local governments are 82.6 percent and 94.7 percent, respectively.

The subsidies included in the national "S&T-related budget" and paid to regional governments amounted to a total of approximately ¥28.3 billion in FY1991, or 1.4 percent of the total S&T-related budget.⁶ (See Table 4-1-2.)

Table 4-1-2. S&T Subsidies to Regional Governments by Ministries
(FY1991, million yen)

Ministries	Subsidies
Ministry of International Trade and Industry	1,801
Science and Technology Agency	865
Ministry of Agriculture, Forestry and Fishery	2,501
Ministry of Education	4,439
Environment Agency	557
Ministry of Health and Welfare	18,308
Economic Planning Agency	28,293
Total	28,293

Total S&T budget of government	2,022,631
S&T subsidies to regional governments (%)	28,293 (1.4)

The total S&T-related expenditures (in FY1990) by the 45 prefectures that responded to our survey was about ¥451.4 billion, or 1.26 percent of the total financial outlays of the 45 prefectures and 0.13 percent of the [sum of] prefectural gross products (in FY 1989). (See Table 4-2-2.)

⁶ These subsidy figures were calculated from "Complete List of FY1991 Subsidies" edited by the Financial Survey Association and from "Overview of S&T-Related Budget Requests in FY1992."

Incidentally, the national S&T-related budget included in the general account is 1.36 percent of the total national budget (initial FY1991 budget), while the total S&T-related budget is 0.53 percent of the GNP (total FY1990 budget divided by FY1989 GNP).

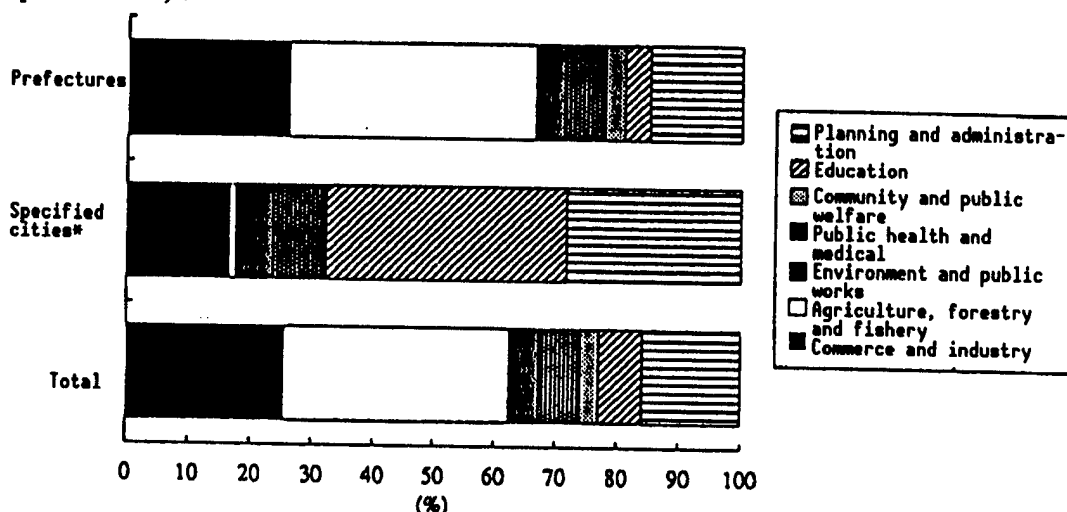
(2) Details of Regional S&T-Related Budgets

We summarize in this section the responses from 45 prefectures and 7 designated cities which are classified into three categories: "[local government] Departments in charge," "Survey questions," and "Budgets for public research institutions."

(a) Classification by Departments in Charge

Local governments have administrative units with various names with diverse jurisdictions. In this survey, we have decided to use seven classifications—"Commerce and industry," "Agriculture, forestry and fishery," "Environment and public works," "Public health and medical," "Community and public welfare," "Education," and "Planning and administration." The correspondence between our classifications and the actual names of administrative units is listed in Table 4-1-3. For instance, a department named "Public Health and Environmental Department," which matches two of our categories, has been classified according to the actual type of work performed as indicated in the reply to our questionnaires. As a result, some department names appear in more than one categories.

The (percentage) details of the total S&T-related budgets of prefectures and designated cities are illustrated in Figure 4-1-2 (Table 4-1-4 and Figure 4-1-3 for the actual amount of budgets and their compositions classified according to departments).



*Cities which have higher governability than ordinary cities, designated by a government ordinance.

Figure 4.1.2 S&T Budgets by Department (FY1990, Shares)

Table 4-1-3. List of Department Names [No. in () number of prefectures]

Department classification	Actual department names				
Commerce and Industry	Economics bureaus (7) Commerce, industry, labor & development (1)	Economics & labor (1) Commerce, industry, labor & tourism (4)	Social (1) Commerce, industry, & labor (30)	Commerce, industry, tourism & labor (1) Labor (4)	Commerce, industry (9)
Agriculture, Forestry and Fishery	Economics bureau (1) Fishery, forestry (1) Agriculture (2) Forestry, fishery (2)	Economics & labor, fishery divisions (1) Agriculture & fishery (2) Agriculture, forestry, fishery (16) Forestry (7)	Fishery bureau (3) Agriculture & fishery (1) Agriculture & fishery (2)	Fishery (4) Agriculture (14) Forestry & fishery (3)	Fishery, forestry (1) Agriculture, land & forestry (2) Forestry (1)
Environment and Public Works	Medical & environment (2) Environment & public health (12) Public housing & urban development (1)	Environment bureau (1, + 1 city) Environmental preservation bureau (1) Public welfare & environment (2)	Environment bureau (2 cities) Planning, community, env. improvement division (1) Public works (12)	Environment (5) Public buildings (1) Public health & medical (1)	Environment & public health (1 city) Public housing bureau (1 city) Public health & environment (6)
Public Health and Medical	Medical & environment (3) Environment & public health (5) Scavengery bureau (1) Public health bureau (1)	Medical bureau (4 cities) Public health, public welfare (1) Public life & welfare (1)	Medical (7) Public enterprises management bureau (1) Public welfare & health (1)	Sewage works bureau (1) Health & welfare (4) Public health & medical (2)	Environment, public health (1 city) Water works bureau (3) Public health & environment (14)
Community and Public Welfare	Community & public welfare (2) Public life & welfare (1)	Community (1) Public life & culture co-ordination (1)	Public transportation bureau (city) Public life & culture (1)	Fire defense bureau (1 city) Public welfare bureau (1 city)	Public welfare & environment (2) Public welfare (1)
Education	Board of education (15 + 5 cities) City university office (1)	Education bureau (1 + 1 city)	Education agency (6)	Public university arrangement office (1)	
Planning and Administration	Planning & development (2) Planning and promotion (2) Planning bureau (1 city)	Planning & management bureau (1) Planning & promotion (1) General affairs, governors' sec. (1)	Planning bureau (1) Planning & coordination (1) Regional development (1)	Planning & community (1) Planning & coordination (4) Mutsuogawahara (a place name) development (1)	Planning & fiscal affairs (2) Planning (10)

Table 4-1-4. S&T Budget Details for Prefectures and Specified Cities*
(Classified by departments)

(1) Prefectures

(FY1990, ¥ million)

Departments	S&T budget	Shares (%)
Commerce and Industry	118,631	26.3
Agriculture, Forestry and Fishery	181,528	40.2
Environment and Public Works	21,599	4.8
Public Health and Welfare	29,853	6.6
Community and Public Welfare	14,421	3.2
Education	18,478	4.1
Planning and Administration	66,881	14.8
Prefectural totals	451,392	100.0

(2) Specified cities*

(FY1990, ¥ million)

Commerce and Industry	6,869	16.8
Agriculture, Forestry and Fishery	347	0.8
Environment and Public Works	2,447	6.0
Public Health and Welfare	3,567	8.7
Community and Public Welfare	7	0.02
Education	16,155	39.4
Planning and Administration	11,571	28.2
Specified city totals	40,963	100.0

(3) Total

(FY1990, ¥ million)

Commerce and Industry	125,500	25.5
Agriculture, Forestry and Fishery	181,876	36.9
Environment and Public Works	24,046	4.9
Public Health and Welfare	33,420	6.8
Community and Public Welfare	14,428	2.90
Education	34,633	7.0
Planning and Administration	78,451	15.9
Grand totals	492,355	100.0

*Cities which have higher governability than ordinary cities, designated by a government ordinance.

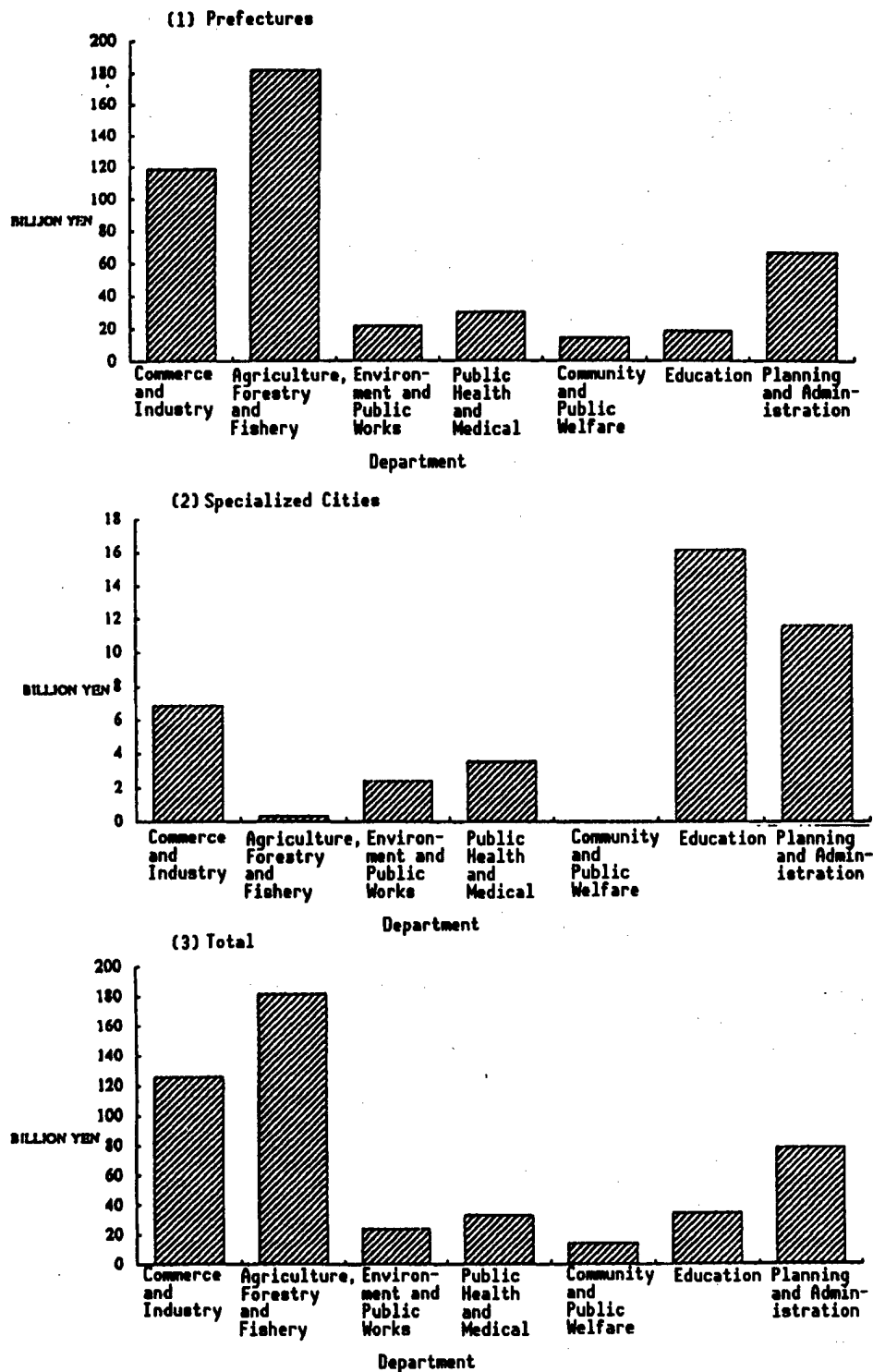


Figure 4.1.3. S&T Budget Classified by Departments (FY1990, Prefectures)

The largest share of the prefectural budgets is used by agriculture, forestry and fishery departments. About two-thirds of the S&T-related budgets is assigned to agriculture, forestry and fishery departments (40.2 percent) and commerce and industry departments (26.3 percent).

On the other hand, the share of agriculture, forestry and fishery departments in designated cities is extremely small, (0.8 percent), while education departments get the largest share. About two-thirds of the S&T-related budgets is shared between education departments (39.4 percent) and planning and administration departments (28.2 percent).

When the two types of local governments are combined, "agriculture, forestry and fishery" departments get more than one-third (36.9 percent), "commerce and industry" departments get more than one-quarter (25.5 percent), and "planning and administration" departments get less than one-sixth (15.9 percent), all together about 80 percent of the total budget. The rest of the budget is shared in the order "education," "public health and medical," "environment and public works," and "community and public welfare" departments. "Planning and administration" departments receive a relatively large share of the S&T-related budgets because these departments manage part of the budgets for higher educational institutions such as public universities and budgets for reorganizing public research institutions.

(b) Details According to Questionnaires

As was mentioned earlier, we have used 24 questions in our survey. These questions are grouped into eight categories (Table 4-1-5) listed below.

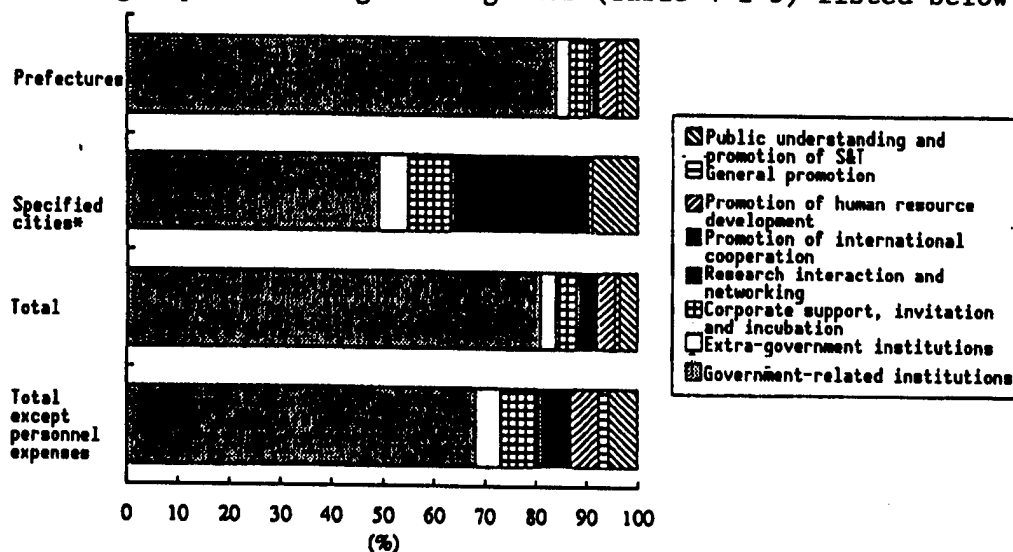


Figure 4-1-4. S&T Budgets by Questionnaire Items (FY1990, Shares)

The share (percentage) of each group is illustrated in Figure 4-1-4, where "public research institutions and universities [government-related institutions in the figures and tables]" occupy a relatively high percentage.

Table 4-1-5. Survey on Regional S&T Budgets: Questionnaire Items

Classification	Item categories	Survey question items
Establishment and management of institutions	Government-related institutions	Management of public research institutions (Q1) Reorganization of public research institutions (Q6) Management of higher educational organs (Q2)
	Extra-governmental institutions	Establishment and management of government-affiliated R&D support institutions (Q4) Establishment and management of government-affiliated R&D support institutions (Q7) S&T promotion fund (Q8)
Promotion of various projects	Corporate support, invitation and incubation	Support to technological development and advancement of local firms (Q10) Technological advance and guidance for local firms (Q12) Invitation of incubation of R&D firms (Q11)
	Research interaction and networking	Support to research interaction (industry-academia-government) (Q13) Promotion of research interaction in private sector (interlaboratory, etc.) (Q15) Offer of S&T information (External system) (Q14) Expenditure to central governmental research institutions (Q9) Research subsidies to medical institutions (Q3)
	Promotion of international cooperation	Setting-up stations for international cooperation (Q19) Promotion of international cooperation (researcher acceptance, support, etc.) (Q20)
	Promotion of human resources	Human resource development for experts (Q17) Human resources development of younger researchers (Q18)
General promotion of S&T policy	General promotion	General promotion of S&T policy (Q21) Promotion system of R&D (Subsidies on scientific research, etc.) (Q23) Inquiry and research on specific problems (Q24)
	Public understanding and promotion of S&T	Promotion of understanding and acceptance of citizens (Q22) Promotion of S&T education (Younger generation and life-long education) (Q16) Science museums (Q5)

Table 4-1-6. S&T Budget Details for Prefectures and Specified Cities*
(Classified by questionnaire items)

(1) Prefectures

(FY1990), ¥ million)

Questionnaire items	S&T budget	Shares (%)
Government-related institutions	381,120	83.99
Extra-governmental institutions	11,693	2.58
Corporate support, invitation and incubation	16,830	3.71
Research interaction and networking	5,385	1.19
Promotion of international cooperation	4,593	1.01
Promotion of human resources development	15,576	3.43
General promotion	5,335	1.18
Public understanding and promotion of S&T	13,254	2.92
Prefectural total		100.0

The sum is not equal to total S&T budget because of double classification.

(2) Specified cities*

(FY1990), ¥ million)

Questionnaire items	S&T budget	Shares (%)
Government-related institutions	20,218	49.29
Extra-governmental institutions	2,240	5.46
Corporate support, invitation and incubation	3,394	8.27
Research interaction and networking	335	0.82
Promotion of international cooperation	10,938	26.67
Promotion of human resources development	221	0.54
General promotion	85	0.21
Public understanding and promotion of S&T	3,589	8.75
Prefectural total		100.0

The sum is not equal to total S&T budget because of double classification.

[continued]

[Continuation of Table 4-1-6]

(3) Questionnaire items (FY1990), ¥ million)

Questionnaire items	S&T budget	Shares (%)
Government-related institutions	401,338	81.11
Extra-governmental institutions	13,932	2.82
Corporate support, invitation and incubation	20,223	4.09
Research interaction and networking	5,720	1.16
Promotion of international cooperation	15,532	3.14
Promotion of human resources development	15,797	3.19
General promotion	5,420	1.10
Public understanding and promotion of S&T	16,843	3.40
Prefectural total		100.0

The sum is not equal to total S&T budget because of double classification.

(4) Total except personnel expenses (FY1990), ¥ million)

Questionnaire items	S&T budget	Shares (%)
Government-related institutions	200,586	68.21
Extra-governmental institutions	13,932	4.74
Corporate support, invitation and incubation	20,223	6.88
Research interaction and networking	5,720	1.95
Promotion of international cooperation	15,532	5.28
Promotion of human resources development	15,797	5.37
General promotion	5,420	1.84
Public understanding and promotion of S&T	16,843	5.73
Prefectural total		100.0

The sum is not equal to total S&T budget because of double classification.

(The actual amount of each group's budget and its share are listed in Table 4-1-6.)

Prefectures are spending 84.0 percent of S&T-related budgets, or about ¥381.1 billion, on public research institutions and universities.

However, this share for designated cities is reduced to about one-half (49.3 percent), spreading the rest of the budgets in international exchange and public relations [public understanding and promotion of S&T in figures and tables]. When local governments are combined, more than 80 percent (81.1 percent, or about ¥401.3 billion) is spent on "public research institutions and universities."

Although only the "public research institutions and universities" category in our survey includes payroll, this category occupies almost 70 percent (68.2 percent) of the total budget, or about ¥200.6 billion, even excluding payroll.

(c) Details of Budgets Related to Public Research Institutions

As was described earlier, more than 80 percent of S&T-related budgets of local governments are assigned to "public research institutions and universities." Of this portion, more than three-quarters (75.2 percent) is used for public research institutions. When budgets for reorganization are included, public research organizations received a total of about ¥301.8 billion (61.3 percent of the S&T-related budgets), while the total budget becomes about ¥269.4 billion (54.7 percent) when the reorganization budgets are excluded.

In Figure 4-1-5, we illustrate the number of public research institutions classified according to their supervisory departments and the institutions' FY1990 appropriations. Institutions related to agriculture, forestry and fishery account for about 60 percent both in number and budget, while those related to commerce and industry account for about 20 percent in number and about 25 percent in budget. Institutions related to environment and public works and those related to public health and medical service account for about 7 percent and 10 percent, respectively (see Table 4-1-7 for the actual numbers).

There are three public research institutions that belong to the categories of community and public welfare or planning and administration. The names of these institutions are listed in Table 4-1-8.

Of the total budget of approximately ¥269.4 billion (excluding budgets for reorganizations), about ¥154.9 billion (57.5 percent) is used for personnel budgets. The responses to our questionnaires identified about ¥29.8 billion (11.1 percent) as R&D expenditures, which is an average of about ¥5.6 million per research institution (Table 4-1-7.)

A detailed classification of the R&D expenditures according to supervisory departments is shown in Figure 4-1-6.

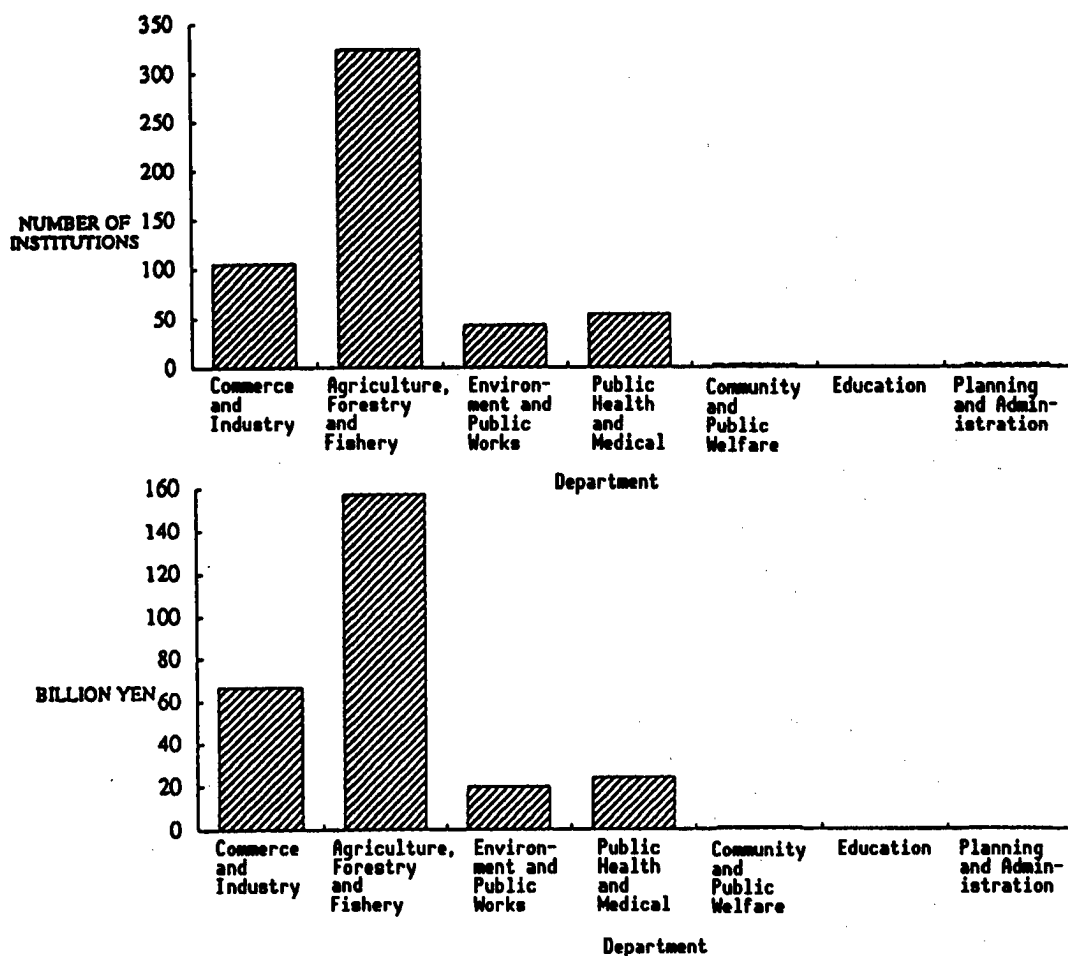


Figure 4-1-5(1) Number of Public Research Institutions Classified by Department
 (2) Total S&T Expenditures of Public Research Institutions by Department

Table 4-1-7. Number of Public Research Institutions and Expenditures Details Classified by Department (FY1990)

Departments	No. of institutions		Total expenditures (# mil- lion)	Shares (%)	Expenditure items (\$ million)					
		Shares (%)			Personnel	Opening	Editing and research	Advice & support	Equip- ment	Mainte- nance
Commerce and industry	105	19.7	66,609	24.7	30,932	4,525	5,867	1,697	22,302	1,286
Agriculture, forestry and fishery	324	60.8	157,359	58.4	95,249	13,358	19,724	1,608	23,250	4,174
Environment and public works	43	8.1	19,702	7.3	11,844	2,090	1,794	76	2,682	970
Public health and medical	55	10.3	23,951	8.9	15,863	2,716	2,096	29	2,014	1,233
Community and public welfare	3	0.6	1,143	0.4	740	18	165	4	217	0
Education	0	0.0		0.0						
Planning and administration	3	0.6	602	0.2	269	110	120	50	50	4
Totals	533	100.0	269,366	100.0	154,897	22,816	29,766	3,462	50,515	7,668
				Shares	57.5%	8.5%	11.1%	1.3%	18.8%	2.8%

Table 4-1-8. List of Public Research Institutions Affiliated to Community and Public Welfare Departments and Planning and Administration Departments

Prefecture	Name of institutions	Actual department names	Department classification
Saitama	Handicapped Persons Rehabilitation Center (Welfare Engineering Laboratory)	Public life and welfare department	Community and public welfare
Ishikawa	Institution of Agricultural Resource	General affairs department	Planning and administration
Fukui	Environment Center	Community and public welfare	Community and public welfare
Sizuoka	Environment Radiant Rays Watching Center	Planning and coordination department	Planning and administration
Aichi	Institution of Development Retardation	Public welfare department	Community and public welfare
Siga	Institution of Biwako Lake	Planning department	Planning and administration

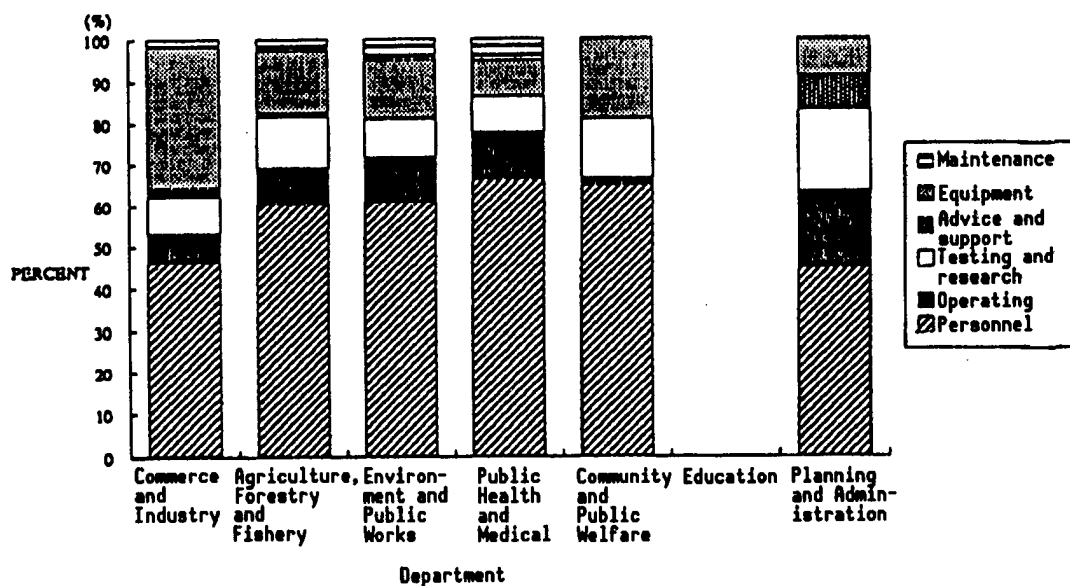


Figure 4-1-6. Public Research Institution Expenditures Classified by Department (Shares)

In this section, we compare the total, regional S&T-related budgets of individual local governments and also compare departments to which public research institutions belong.

The total, regional S&T-related budgets are illustrated in Figure 4-2-1 according to individual local governments. The top, crossed part of the bar graph stands for "budgets for public, higher education institutions" such as public universities (considered to fluctuate widely depending on whether a department supervises educational institutions or not), while the white part represents "budgets for reorganizing public research institutions" (considered to fluctuate widely according to fiscal years). The bottom, black part depicts other "normal expenditures."



Figure 4-2-1. Regional Distribution of S&T Budgets

The average of the "regular expenditures" for prefectures is approximately ¥7.2 billion, while that for designated cities is approximately ¥4.1 billion. The actual amount for individual prefectures varied widely from about ¥2.7 billion to ¥21.5 billion, while that for individual designated cities ranged widely from about ¥0.8 billion to ¥15.2 billion (Table 4-2-1).

Table 4-2-1. S&T Budget: Regional Distribution (FY1990, ¥1,000)

Prefectures & specified cities*	Yearly con- stant S&T budgets	Budgets for reorganiza- tion of public research in- stitutions	Budgets for management of higher educational organs	Totals
Hokkaido	18,524,113	1,201,928	1,943,228	21,669,269
Aomori	8,942,688	120,937		9,063,625
Iwate	5,089,880	2,467,188	681,998	8,239,066
Miyagi	5,029,902		797,122	5,827,024
Akita	8,962,708	481,987	1,148,327	10,593,022
Yamashita	4,649,704	196,136	300,163	5,146,003
Fukushima	5,121,421	1,737,532	8,071,623	14,930,576
Ibaragi	6,852,392	97,319	593,587	7,543,298
Tochigi	8,015,645	431	631,361	8,647,437
Gunma	4,074,719		617,614	4,692,333
Saitama	7,413,845	1,360		7,415,205
Chiba	15,269,346	1,704,890	627,815	17,602,051
Kanagawa	21,494,283	12,374,794	303,965	34,173,042
Niigata	6,814,576		361,782	7,176,358
Toyara	8,754,182		4,219,765	12,973,947
Ishikawa	6,945,780	6,798	1,007,939	7,960,517
Fukui	6,350,077	4,027,618	7,145,101	17,522,796
Yamanashi	2,684,922			2,684,922
Nagaro	6,281,114	54,844	252,588	6,588,546
Gifu	4,352,814	0	80,870	4,433,684
Shizuoka	18,228,471	1,300	2,770,506	21,000,277
Aichi	10,180,513	6,000		10,186,513
Mie	10,966,789	403,055	459,956	11,829,800
Shiga	6,122,022	0	1,662,317	7,784,339
Kyoto	4,188,610		1,221,544	5,410,154
Osaka	12,750,594	79,525	12,012,773	24,842,892
Hyogo	8,903,148	912,626	9,307,606	19,123,380
Nara	3,029,894	184,592	4,515,347	7,729,833
Wakayama	4,061,539	63,096	17,728,236	21,852,961
Tottori	3,328,213			3,328,213
Shimane	3,268,101			3,268,101
Okayama	4,642,086	115,400	874,047	5,631,533
Hiroshima	7,980,607	4,561,412	978,336	13,520,355
Yamaguchi	4,777,642			4,777,642
Tokushima	4,091,313	2,874,399	296,514	7,262,226

[Continued]

[Continuation of Table 4-2-1]

Prefectures & specified cities*	Yearly con- stant S&T budgets	Budgets for reorganiza- tion of public research in- stitutions	Budgets for management of higher educational organs	Totals
Kagawa	3,340,456		384,744	3,725,200
Ehime	9,868,870	3,877,086	878,530	14,624,486
Kochi	3,921,830	4,016,599		7,938,429
Fukuoka	8,021,739	31,537	2,828,199	10,881,475
Saga	4,336,786			4,336,786
Kumamoto	4,866,711	0	1,288,821	6,155,532
Oita	4,927,421	2,446	4,000	4,933,867
Miyazaki	4,123,447	538,106	169,970	4,831,523
Kagashima	6,770,576		768,354	7,538,930
Okinawa	3,994,036	326		3,994,362
Subtotal	322,315,525	42,141,267	86,934,738	451,391,530
Average	7,162,567	936,473	1,931,883	10,030,923
Sendai	15,230,936			15,230,936
Kawasaki	1,052,893			1,052,893
Kyoto	3,620,814		69,053	3,689,867
Osaka	4,535,450		10,762,409	15,297,859
Kobe	752,424		1,761,060	2,513,484
Hiroshima	1,526,338			1,526,338
Kitayushu	1,651,664			1,651,664
Subtotal	28,370,519	0	12,592,522	40,963,041
Average	4,052,931	0	1,798,932	5,851,863
Total	350,686,044	42,141,267	99,527,260	492,354,571

*Cities which have higher governability than ordinary cities, designated by a government ordinance.

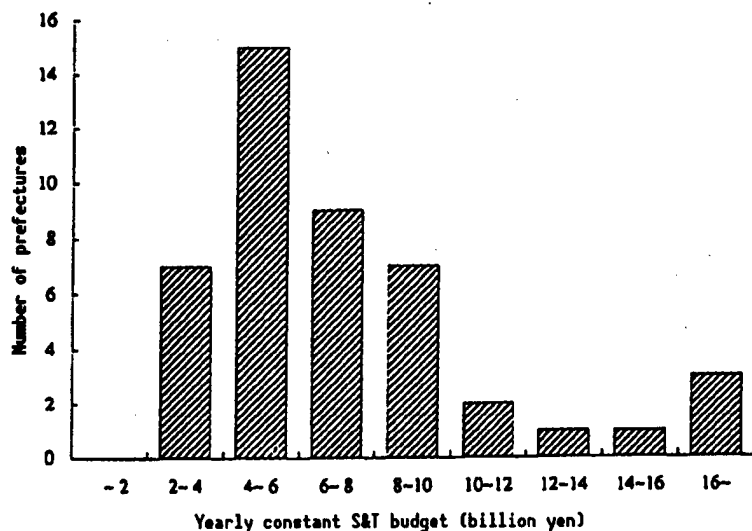


Figure 4-2-2. Yearly Constant S&T Budgets for Prefectures

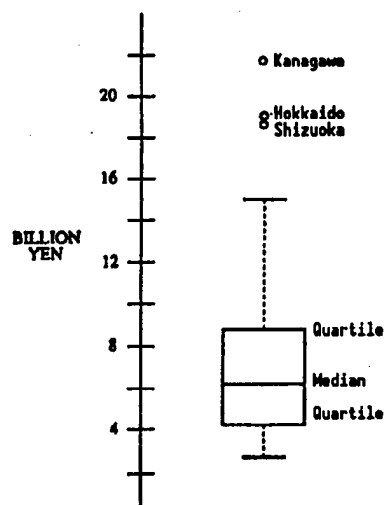


Figure 4-2-3. Prefectural Distribution of Yearly Constant S&T Budgets

The distribution of prefectural "regular budgets" in steps of ¥2 billion (Figure 4-2-2) shows the largest number, 15 prefectures (33.3 percent), in "¥4 billion or more but less than ¥6 billion," 9 prefectures (20.0 percent) in "¥6 billion or more but less than ¥8 billion," and 7 prefectures each (15.6 percent) in "¥8 billion or more but less than ¥10 billion," respectively. Figure 4-2-3 is a box-and-whisker plot of the distribution of local government budgets.

We have studied the correlation between S&T-related budgets ("regular expenditures" of prefectures only) and prefectural "population," "prefectural gross product," "prefectural per capita income," "financial outlays," and "number of researchers."⁷ Among these parameters, correlation was identified in four of them: In a descending order, the correlation coefficients are 0.722 for "financial outlays," 0.719 for the "number of researchers," 0.718 for "population," and 0.678 for the "prefectural gross product." The distribution of S&T-related budgets (bar graphs) and the distribution of these five parameters (x-y plots) are shown in Figures 4-2-4 (1) through (5).

⁷ Sources of our data are listed below:

Population: National census as of 1 October 1990

Prefectural gross products: "Outline of Regional Economy, 1992" edited by the Research Bureau, Economic Planning Agency, FY1989

Per capita prefectural income: Ditto, FY1989

Financial outlays: "White Paper on Regional Finance," edited by the Ministry of Home Affairs, FY1990

Number of researchers and technicians: Estimated as 1 percent of the national census as of 1 October 1990. Sum of (1) scientific researchers and (2) technicians classified as those holding professional and technical jobs (medium-level classification).

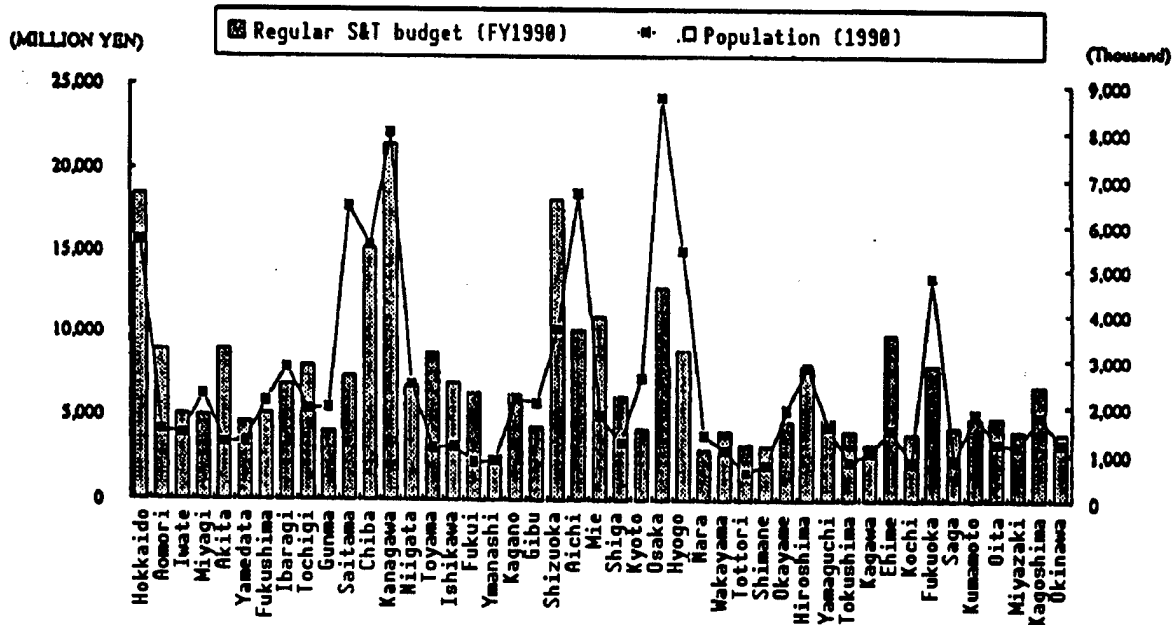


Figure 4-2-4(1). Relationship Between Regular S&T Budget and Population by Prefectures

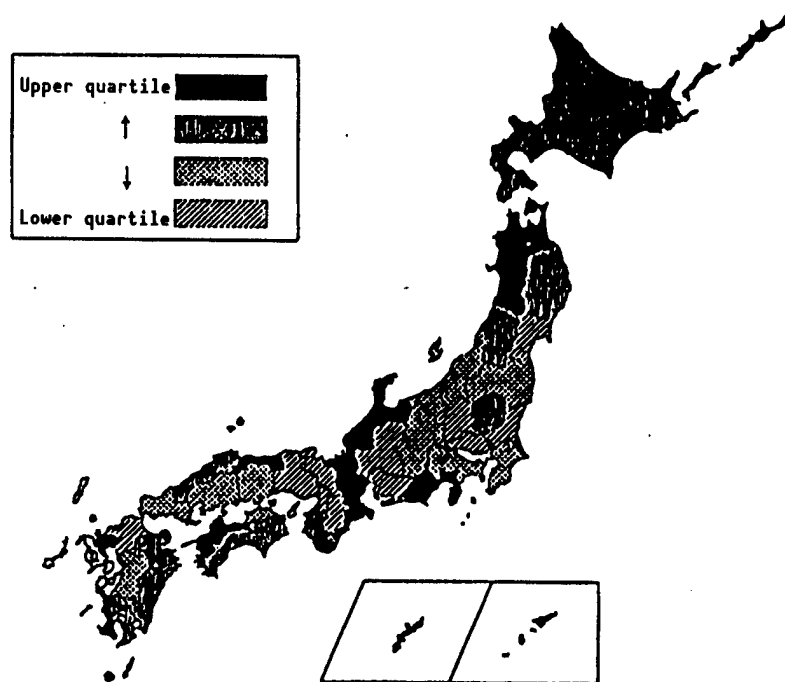


Figure 4-2-5(1). Regional Distribution of Regular S&T Budget Per Capita

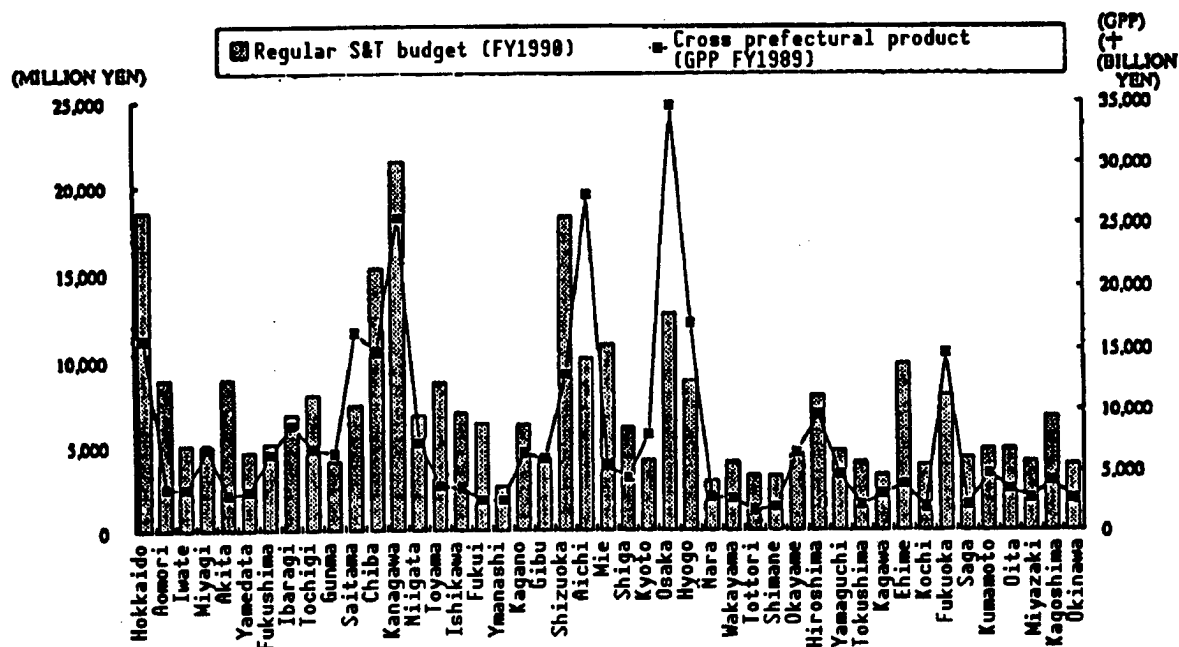


Figure 4-2-4(2). Relationship Between Regular S&T Budget and Gross Prefectural Product by Prefecture

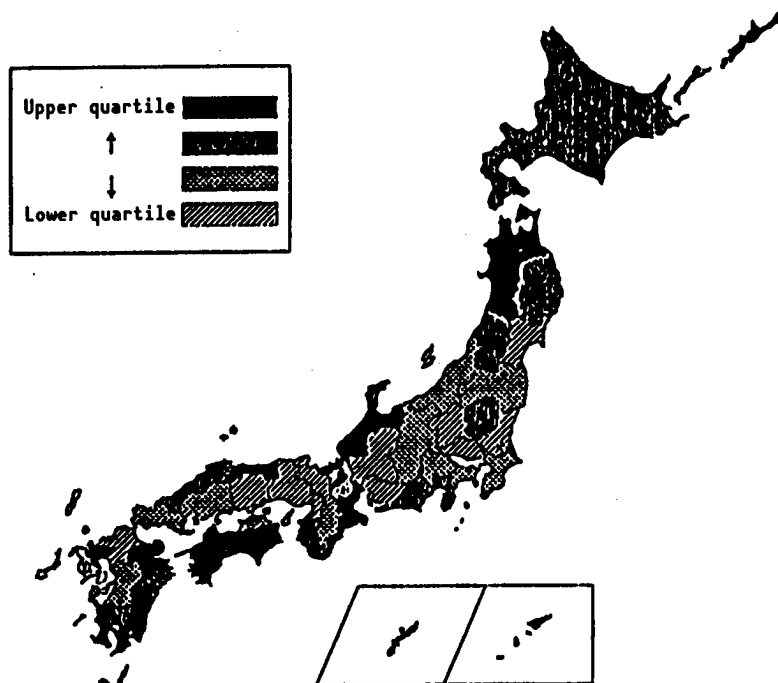


Figure 4-2-5(2). Regional Distribution of Regular S&T Budget to Gross Prefectural Product (Ratio)

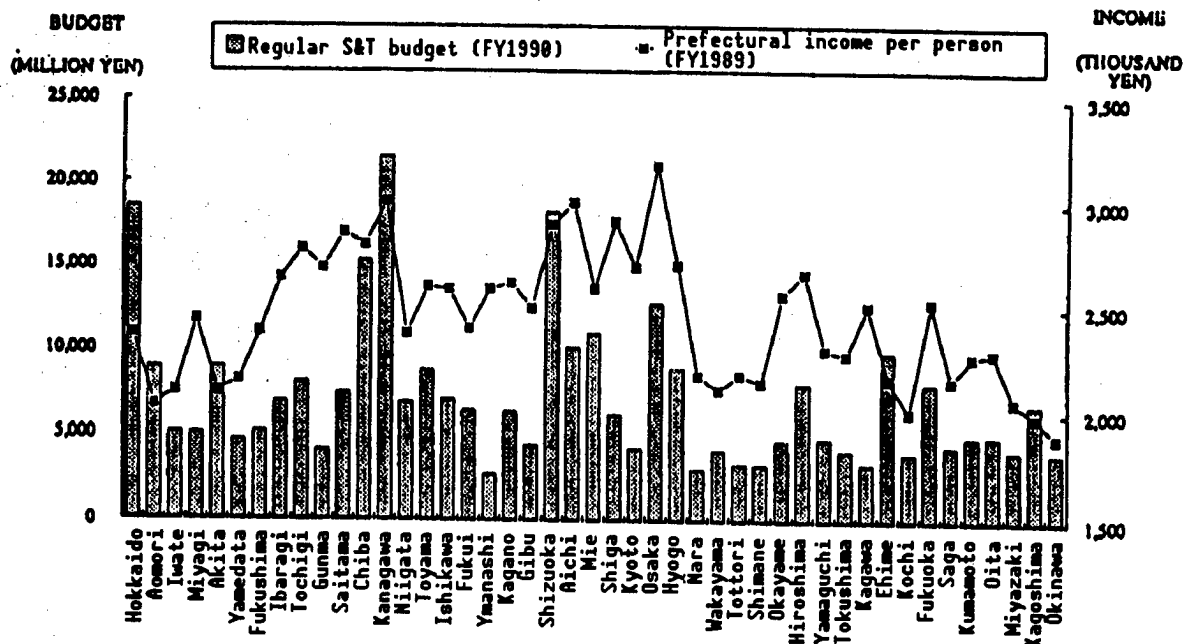


Figure 4-2-4(3). Relationship Between Regular S&T Budgets and Prefectural Incomes

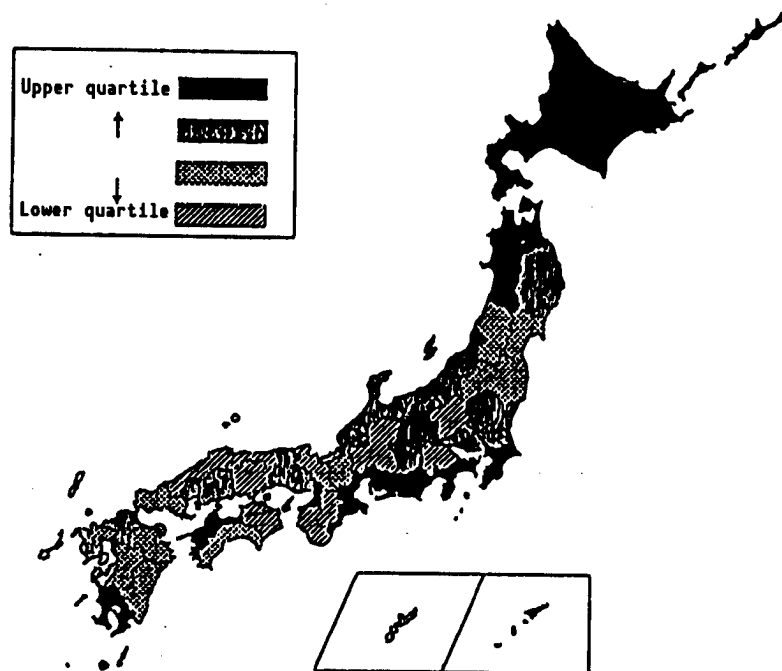


Figure 4-2-5(3). Regional Distribution of Regular S&T Budget to Prefectural Income Per Capita

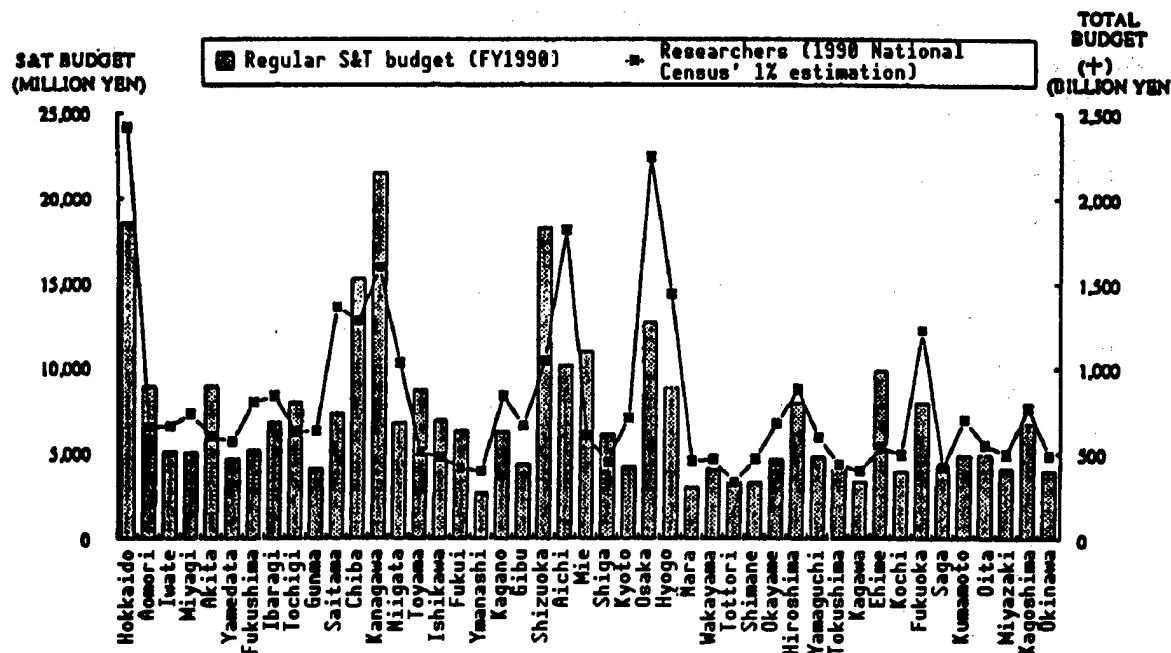


Figure 4-2-4(4). Relationship Between Regular S&T Budget and Total Prefectural Budget

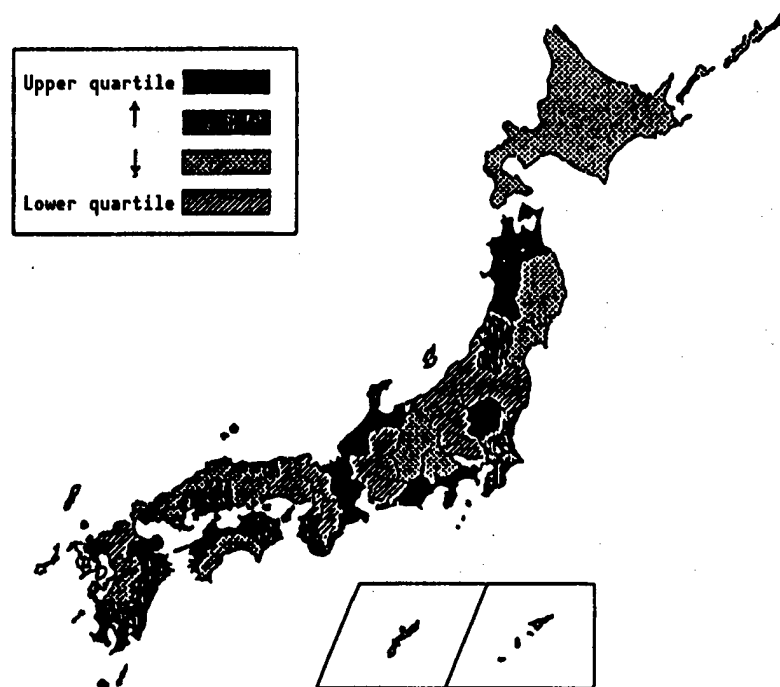


Figure 4-2-5(4). Regional Distribution of Regular S&T Budget to Total Prefectural Budget

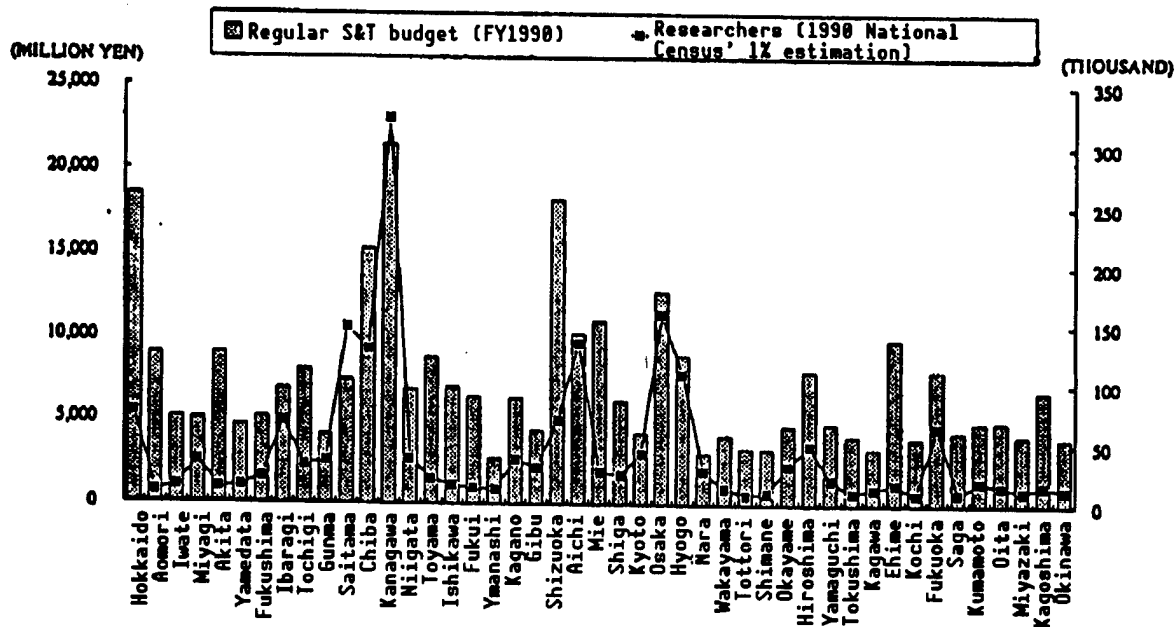


Figure 4-2-4(5). Relationship Between Regular S&T Budget and Number of Researchers in Prefectures

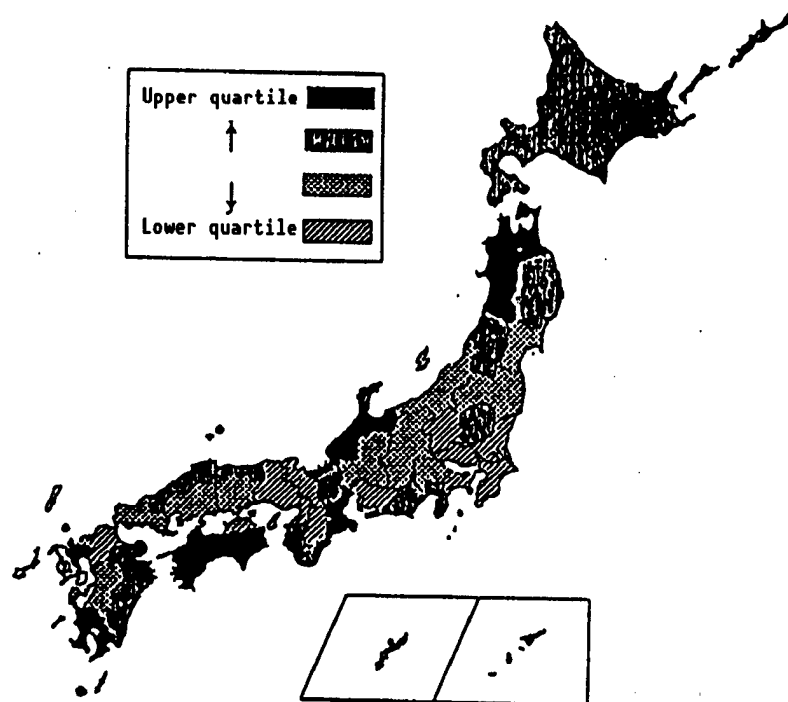


Figure 4-2-5(5). Regional Distribution of Regular S&T Budget Per Researcher

Table 4-2-2. Basic S&T Data for Prefectures

Prefecture	Total S&T budget	Regular S&T budget	Population (1990)			Gross prefectural product		
	(A) (FY1990, ¥ Million)	(B) (FY1990, ¥ Million)	(C) (Thou- sand)	Per capita (A/C) (¥)	Per capita (B/C) (¥)	(D) (¥ Million)	(A/D)	(B/D)
Hokkaido	21,669	18,524	5,644	3,839.5	3,282.3	15,670	0.14%	0.12%
Aomori	9,064	8,943	1,483	6,112.0	6,030.4	3,533	0.26%	0.25%
Iwate	8,239	5,090	1,417	5,814.6	3,592.1	3,494	0.24%	0.15%
Miyagi	5,827	5,030	2,249	2,591.5	2,237.0	6,775	0.09%	0.07%
Akita	10,593	8,963	1,227	8,629.8	7,301.6	2,992	0.35%	0.30%
Yamagata	5,146	4,650	1,258	4,089.3	3,694.9	3,252	0.16%	0.14%
Fukushima	14,931	5,121	2,104	7,095.9	2,434.0	6,272	0.24%	0.08%
Ibaragi	7,543	6,852	2,845	2,651.0	2,408.2	8,652	0.09%	0.08%
Tochigi	8,647	8,016	1,935	4,468.5	4,142.1	6,730	0.13%	0.12%
Gunma	4,692	4,075	1,966	2,386.4	2,072.3	6,379	0.07%	0.06%
Saitama	7,415	7,414	6,405	1,157.7	1,157.5	16,228	0.05%	0.05%
Chiba	17,602	15,269	5,555	3,168.4	2,748.5	14,726	0.12%	0.10%
Kanagawa	34,173	21,494	7,980	4,282.1	2,693.4	25,349	0.13%	0.08%
Niigata	7,176	6,815	2,475	2,900.0	2,753.8	7,198	0.10%	0.09%
Toyama	12,974	8,754	1,120	11,582.0	7,815.0	3,693	0.35%	0.24%
Ishikawa	7,961	6,946	1,165	6,835.3	5,964.0	3,597	0.22%	0.19%
Fukui	17,523	6,350	824	21,276.0	7,710.2	2,527	0.69%	0.25%
Yamanashi	2,685	2,685	853	3,147.7	3,147.7	2,540	0.11%	0.11%
Nagano	6,589	6,281	2,157	3,055.0	2,912.4	6,392	0.10%	0.10%
Gifu	4,434	4,353	2,067	2,145.4	2,106.3	5,962	0.07%	0.07%
Shizuoka	21,000	18,228	3,671	5,720.8	4,965.7	12,936	0.16%	0.14%
Aichi	10,187	10,181	6,690	1,522.5	1,521.7	27,279	0.04%	0.04%
Mie	11,830	10,967	1,793	6,599.5	6,118.0	5,426	0.22%	0.20%
Shiga	7,784	6,122	1,222	6,368.1	5,008.2	4,397	0.18%	0.14%
Kyoto	5,410	4,189	2,603	2,078.8	1,609.4	7,962	0.07%	0.05%
Osaka	24,843	12,751	8,735	2,844.2	1,459.8	34,666	0.07%	0.04%
Kyogo	19,123	8,903	5,405	3,538.0	1,647.2	17,035	0.11%	0.05%
Nara	7,730	3,030	1,375	5,619.7	2,202.8	2,846	0.27%	0.11%
Wakayama	21,853	4,062	1,074	20,341.2	3,780.6	2,696	0.81%	0.15%
Tottori	3,328	3,328	616	5,405.2	5,405.2	1,731	0.19%	0.19%
Shimane	3,268	3,268	781	4,184.5	4,184.5	1,998	0.16%	0.16%
Okayama	5,632	4,642	1,926	2,924.1	2,410.3	6,484	0.09%	0.07%
Hiroshima	13,520	7,981	2,850	4,744.3	2,800.4	9,539	0.14%	0.08%
Yamaguchi	4,778	4,778	1,573	3,038.0	3,038.0	4,697	0.10%	0.10%
Tokushima	7,262	4,091	832	8,733.0	4,919.9	2,125	0.34%	0.19%
Kagawa	3,725	3,340	1,023	3,639.9	3,264.0	3,049	0.12%	0.11%
Ehime	14,624	9,869	1,515	9,653.0	6,514.0	3,869	0.38%	0.26%
Kochi	7,938	3,922	825	9,621.6	4,753.4	1,935	0.41%	0.20%
Fukuoka	10,881	8,022	4,811	2,261.7	1,667.3	14,645	0.07%	0.05%
Saga	4,337	4,337	878	4,940.2	4,940.2	2,122	0.20%	0.20%
Kumamoto	6,156	4,867	1,840	3,344.7	2,644.4	4,749	0.13%	0.10%
Oita	4,934	4,927	1,237	3,988.8	3,983.6	3,512	0.14%	0.14%
Miyazaki	4,832	4,123	1,169	4,133.3	3,527.6	2,680	0.18%	0.15%
Kagoshima	7,539	6,771	1,798	4,193.5	3,766.1	4,172	0.18%	0.16%
Okinawa	3,994	3,994	1,222	3,267.5	3,267.2	2,671	0.15%	0.15%
Total	451,392	322,316	110,194			337,178		
Average	10,031	7,163	2,449	4,096.4	2,925.0	7,493	0.13%	0.10%
Correlation coefficient to total S&T budget (A)			0.650			0.635		
Correlation coefficient to regular constant S&T budget (B)			0.718			0.678		

[Continuation of Table 4-2-2]

Prefectural income per person (FY1989)			Total prefectural budget (FY1990)			Researchers (1990 National Census' 1% estimation)		
(E)	(A/E)	(B/E)	(F)	(A/F)	(B/F)	(G)	Per researcher (A/G)	Per researcher (B/G)
(¥ thousand)	(Times)	(Times)	(¥ Billion)			(Thousand)	(¥)	(¥)
2,376	9,120	7,796	2,417	0.90%	0.77%	75.2	288,155	246,331
2,032	4,460	4,401	659	1.38%	1.36%	10.6	855,059	843,650
2,096	3,931	2,428	661	1.25%	0.77%	14.5	568,211	351,026
2,442	2,386	2,060	732	0.80%	0.69%	35.3	165,072	142,490
2,098	5,049	4,272	599	1.77%	1.50%	13.0	814,848	689,439
2,152	2,391	2,161	567	0.91%	0.82%	15.0	343,067	309,980
2,386	6,258	2,146	804	1.86%	0.64%	22.0	678,663	232,792
2,638	2,859	2,598	838	0.90%	0.82%	68.8	109,641	99,599
2,780	3,111	2,883	628	1.38%	1.28%	32.3	267,723	248,162
2,684	1,748	1,518	629	0.75%	0.65%	35.9	130,706	113,502
2,858	2,595	2,594	1,360	0.55%	0.55%	147.8	50,171	50,161
2,801	6,284	5,451	1,278	1.38%	1.19%	129.3	136,133	118,092
3,007	11,364	7,148	1,588	2.15%	1.35%	322.8	105,864	66,587
2,377	3,019	2,867	1,027	0.70%	0.66%	37.3	192,396	182,696
2,592	5,005	3,377	505	2.57%	1.73%	21.0	617,807	416,866
2,582	3,083	2,690	477	1.67%	1.46%	15.3	520,295	453,973
2,400	7,301	2,646	412	4.26%	1.54%	13.0	1,347,907	488,467
2,585	1,039	1,039	394	0.68%	0.68%	12.7	211,411	211,411
2,612	2,522	2,405	838	0.79%	0.75%	36.6	180,015	171,615
2,495	1,777	1,745	664	0.67%	0.66%	30.3	146,326	143,657
2,899	7,244	6,288	1,041	2.02%	1.75%	69.4	302,598	262,658
3,002	3,393	3,391	1,810	0.56%	0.56%	134.5	75,736	75,692
2,587	4,573	4,239	604	1.96%	1.82%	26.9	439,770	407,687
2,914	2,671	2,101	448	1.74%	1.37%	24.5	317,728	249,878
2,690	2,011	1,557	710	0.76%	0.59%	42.4	127,598	98,788
3,179	7,815	4,011	2,244	1.11%	0.57%	159.3	155,950	80,041
2,701	7,080	3,296	1,439	1.33%	0.62%	108.7	175,928	81,906
2,174	3,556	1,394	453	1.70%	0.67%	27.6	280,066	109,779
2,108	10,367	1,927	462	4.73%	0.88%	13.5	1,618,738	300,855
2,177	1,529	1,529	331	1.01%	1.01%	8.6	387,002	387,002
2,142	1,526	1,526	466	0.70%	0.70%	10.5	311,248	311,248
2,556	2,203	1,816	678	0.83%	0.68%	32.4	173,813	143,274
2,662	5,079	2,998	878	1.54%	0.91%	49.2	274,804	162,207
2,302	2,075	2,075	593	0.81%	0.81%	20.7	230,804	230,804
2,275	3,192	1,798	435	1.67%	0.94%	10.3	705,070	397,215
2,508	1,485	1,332	397	0.94%	0.84%	13.8	269,942	242,062
2,162	6,764	4,565	534	2.74%	1.85%	17.4	840,488	567,176
2,001	3,967	1,960	490	1.62%	0.80%	9.2	862,873	426,286
2,526	4,308	3,176	1,219	0.89%	0.66%	64.5	168,705	124,368
2,153	2,014	2,014	418	1.04%	1.04%	9.7	447,091	447,091
2,269	2,713	2,145	697	0.88%	0.70%	19.8	310,885	245,793
2,289	2,155	2,153	548	0.90%	0.90%	16.2	304,560	304,162
2,055	2,351	2,007	493	0.98%	0.84%	12.5	386,522	329,876
1,985	3,798	3,411	773	0.98%	0.88%	16.6	454,152	407,866
1,892	2,111	2,111	488	0.82%	0.82%	13.2	302,603	302,578
110,201			35,724			2,020.1		
2,449	4,096	2,925	794	1.26%	0.90%	44.9	223,450	159,554
0.419			0.621			0.683		
0.507			0.722			0.719		

Table 4-2-3. Basic Data for Specified Cities*

Specified* cities	Total S&I budget (A) (FY1990, ¥ Million)	Regular S&I budget (B) (FY1990, ¥ Million)	Population (1990) (C)		Annual amount of individual product (FY1988) (D)		Taxable income (FY1990) (E)			Financial outlay (FY1990) (F)				
			Thou- sand	Per capita (A/C) (¥)	Per capita (B/C) (¥)	(D)	(A/D)	(B/D)	(¥ Billion)	(A/E)	(B/E)	(¥ Billion)	(A/F)	(B/F)
Sendai	15,231	15,231	918	16,584.6	16,584.6	785	1.94%	1.94%	1,180	1.29%	1.29%	295	5.16%	5.16%
Kawasaki	1,053	1,053	1,174	897.1	897.1	5,744	0.02%	0.02%	2,031	0.05%	0.05%	400	0.26%	0.26%
Kyoto	3,690	3,621	1,461	2,525.3	2,478.1	2,909	0.13%	0.13%	2,074	0.18%	0.17%	543	0.68%	0.67%
Osaka	15,298	4,535	2,624	5,830.4	1,728.6	7,417	0.21%	0.06%	3,465	0.44%	0.13%	1,486	1.03%	0.31%
Kobe	2,513	752	1,477	1,701.3	509.3	2,717	0.09%	0.03%	2,051	0.12%	0.04%	755	0.33%	0.10%
Hiroshima	1,526	1,526	1,086	1,405.9	1,405.9	2,343	0.07%	0.07%	1,507	0.10%	0.10%	429	0.36%	0.36%
Kitakyushu	1,652	1,652	1,026	1,609.1	1,609.1	2,335	0.07%	0.07%	1,034	0.16%	0.16%	423	0.39%	0.39%
Total	40,963	28,371	9,767			24,250			13,342			4,332		
Average	5,852	4,053	1,395	4,194.2	2,904.9	3,464	0.17%	0.12%	1,906	0.31%	0.21%	619	0.95%	0.65%
Correlation coefficient to total S&I budget (A)			0.471				0.163		0.376		0.475			
Correlation coefficient to regular S&I budget (B)					-0.151		-0.379				-0.208		-0.160	

*Cities which have higher governability than ordinary cities, designated by a government ordinance.

Figures 4-2-5 (1) through (5) are maps representing the ratio of S&T-related budgets to "per capita R&T-related budgets" marked by quartiles. (The actual numbers are in Table 4-2-2.)

We also examined the correlation [between "S&T-related budgets" and] four parameters—"population," "annual value of industrial products shipped,"⁸ "taxable income," and "financial outlays"—of designated cities, but did not find any correlation (Table 4-2-3).

(2) Regional Comparison of S&T-Related Budgets Classified by Local Government Departments

Local government departments' share of their S&T-related budgets (regular budgets) is 43.7 percent for agricultural, forestry and fishery departments, 30.6 percent for commerce and industry departments, about 4-8 percent for public health and medical departments, planning and administration departments, environmental and public works departments and educational departments, and about 1 percent by community and public welfare departments.⁹ However, the shares in prefectures and those in designated cities are very different, and wide fluctuations exist even among prefectures and among designated cities (Table 4-2-4).

These departmental shares are illustrated in Figure 4-2-6. We illustrated departmental shares of typical prefectures in Figure 4-2-7: An average prefecture (Chiba prefecture, whose departmental shares are closest to the average share distribution); a prefecture dominated by agriculture, forestry and fishery departments (Iwate Prefecture); a prefecture dominated by commerce and industry departments (Shizuoka Prefecture); and a prefecture dominated by planning and administration departments (Mie Prefecture).

⁸ Sources of our data are listed below:

Population: National census as of 1 October 1990

Annual value of industrial products shipped: "Private Sector Capability," edited by Asahi Shimbun, FY1988

Taxable income: Ditto, FY1990

Financial outlays: "White Paper on Regional Finance," edited by the Ministry of Home Affairs, FY1990

⁹ Departmental shares were also discussed in Section 4.1, where S&T-related budgets included "budgets for public institutions of higher education" and "budgets for reorganizing public research institutions." For this reason, numbers in the present section are different from those in Section 4.1.

Table 4-2-4. Regular S&T Budget by Prefectural or City Department (FY1990)

Specified cities	Commerce and industry	Agriculture, forestry, and fishery	Environment and public works	Public health and medical	Community and public welfare	Education	Planning and administration	Totals
Hokkaido	3,222,498	12,318,946	913,230	1,758,006	0	1,000	310,433	18,524,113
Aomori	1,131,658	3,915,113	775,441	0	0	0	1,120,476	8,942,688
Iwate	920,474	3,876,399	0	235,591	0	31,690	25,726	5,069,880
Miyagi	1,278,363	2,528,717	444,834	605,150	0	2,638	170,000	5,029,902
Mito	2,766,942	4,568,170	241,430	1,383,116	0	50	6,000	8,962,708
Yamagata	1,375,584	2,801,924	118,450	282,457	0	187,353	7,756	4,649,764
Fukushima	648,982	3,759,641	178,396	219,376	0	305,026	10,000	5,121,421
Ibaragi	903,473	3,519,688	1,367,767	504,399	0	555,710	1,355	6,852,392
Tochigi	3,279,354	2,710,268	164,233	219,307	1,193,094	453,389	0	8,015,645
Gunma	828,821	2,821,664	0	384,794	0	29,440	0	4,074,719
Saitama	1,569,872	3,281,008	541,398	2,106,592	32,538	100,521	1,918	7,415,845
Chiba	3,979,312	7,989,235	1,106,983	628,676	0	605,378	939,762	15,269,346
Kanagawa	7,824,990	4,398,901	2,034,540	1,212,765	15,003	3,788,618	2,199,466	21,494,283
Niigata	1,729,873	3,672,610	631,397	0	0	469,639	311,057	6,814,576
Toyama	4,886,312	2,602,237	384,281	771,127	0	0	110,325	8,754,182
Ishikawa	3,497,840	2,638,886	134,890	502,112	13,511	0	139,041	6,945,780
Fukui	2,655,403	2,149,512	126,490	642,656	410,674	365,342	0	6,350,077
Yamanashi	756,927	1,630,354	0	292,250	0	0	5,191	2,684,922
Nagano	2,739,178	3,010,287	0	507,481	24,168	0	0	6,281,114
Gifu	1,394,369	2,501,586	220,903	236,056	0	0	0	4,352,814
Shizuoka	11,702,473	3,194,172	0	1,106,344	0	0	165,482	18,228,471
Aichi	3,414,170	4,074,229	7,272,239	522,178	699,960	197,737	0	10,180,513
Mie	1,740,059	2,518,657	278,848	226,118	0	24,060	6,179,047	10,966,789
Shiga	1,181,197	2,239,068	26,307	594,478	0	1,771,246	309,636	6,122,022
Kyoto	1,593,392	2,588,868	0	0	0	0	6,350	4,188,610
Osaka	3,587,579	1,561,771	1,621,356	5,175,892	1,500	2,816	1,000,000	12,750,594
Hyogo	3,271,598	3,272,503	500,317	695,735	0	1,017,163	145,832	8,903,148
Nara	687,080	1,765,554	0	552,260	0	0	25,000	3,029,894
Wakayama	1,293,087	2,130,317	0	459,234	0	178,901	0	4,061,539
Tottori	1,344,057	1,543,992	651	245,644	0	293,889	0	3,328,313
Shimane	547,396	2,476,093	191,151	45,880	0	0	7,579	3,268,101
Okayama	1,409,589	2,295,151	886,618	0	0	50,728	0	4,642,086
Hiroshima	4,006,885	3,203,124	723,136	26,187	0	0	21,275	7,980,607
Yamaguchi	1,248,951	2,571,988	714,806	0	0	241,897	0	4,777,642
Tokushima	926,786	2,351,565	0	533,472	0	279,490	0	4,091,313
Kagawa	850,852	1,492,323	706,571	200,610	0	98	0	3,340,456
Ehime	3,703,164	3,587,525	135,576	379,524	17,793	47,288	0	9,868,870
Kochi	1,363,922	2,065,214	169,033	320,231	0	3,430	0	3,921,830
Fukuoka	2,108,782	4,717,901	0	745,074	0	391,368	58,614	8,021,739
Saga	974,302	2,691,477	472,953	128,059	0	4,995	60,000	4,326,786
Kumamoto	749,096	3,656,053	17,802	412,372	0	0	51,406	4,866,711
Oita	813,155	3,715,541	0	393,473	0	0	5,252	4,927,421
Miyazaki	1,047,933	2,854,161	221,353	0	0	0	0	4,123,447
Kagoshima	1,523,903	4,646,248	427,674	171,362	0	192,522	8,865	6,770,576
Okinawa	678,845	2,834,173	434,934	0	0	5,984	0	3,994,036
Subtotal	100,386,060	152,745,700	18,113,356	23,462,018	2,408,041	11,599,606	13,422,844	322,315,325
Shares	31.20%	47.39%	5.62%	7.28%	0.75%	3.60%	4.16%	100.00%
Sendai	748,890	0	0	486,984	0	2,852,123	11,142,939	15,230,936
Kawasaki	300,000	0	348,253	401,484	0	3,156	0	1,052,893
Kyoto	2,841,989	0	767	539,612	0	238,446	0	3,620,814
Osaka	1,651,426	0	1,399,410	1,090,797	6,510	387,307	0	4,535,430
Kobe	23,259	0	696,744	0	0	32,421	0	752,424
Hiroshima	650,470	347,447	100	528,321	0	0	0	1,526,338
Kitakyushu	653,359	0	1,752	450,715	612	117,586	427,640	1,651,664
Subtotal	6,889,393	347,447	2,447,058	5,497,913	7,122	3,631,059	11,570,579	28,370,519
Shares	24.21%	1.22%	8.63%	12.33%	0.03%	12.80%	40.78%	100.00%
Total	107,275,453	153,093,147	20,560,414	28,959,931	2,415,163	15,230,665	24,993,423	350,685,844
Shares	30.44%	45.63%	5.86%	7.69%	0.69%	4.34%	7.13%	100.00%

*Cities which have higher governability than ordinary cities, designated by a government ordinance.

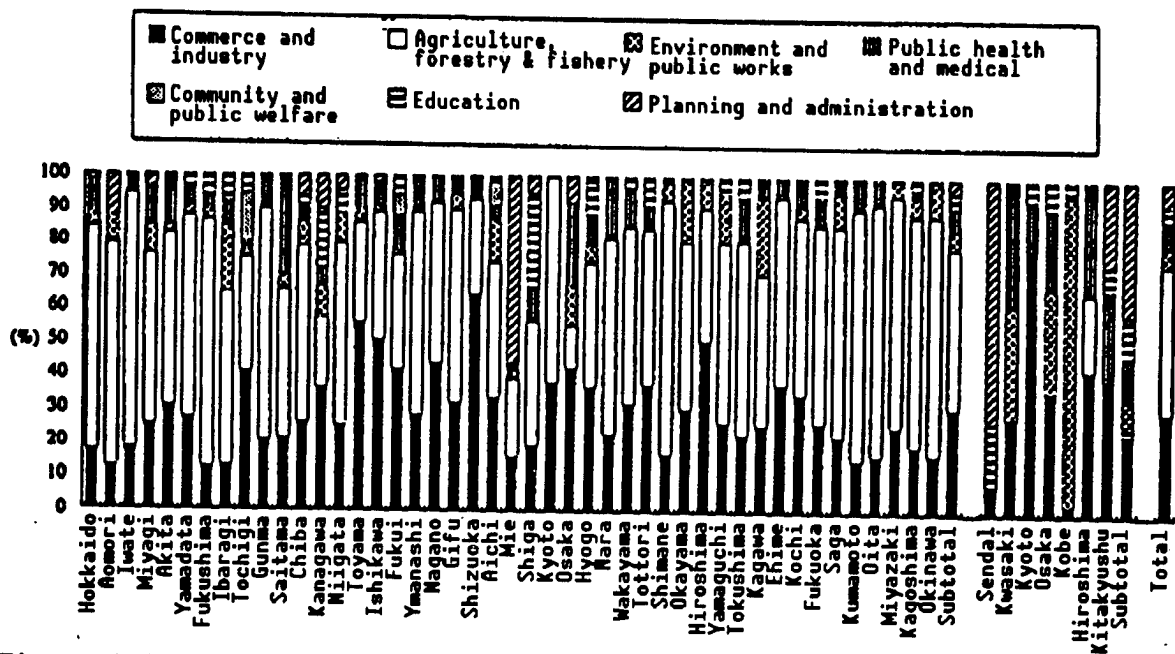


Figure 4-2-6(1). Regular S&T Budget by Prefectural or City Department (FY1990)

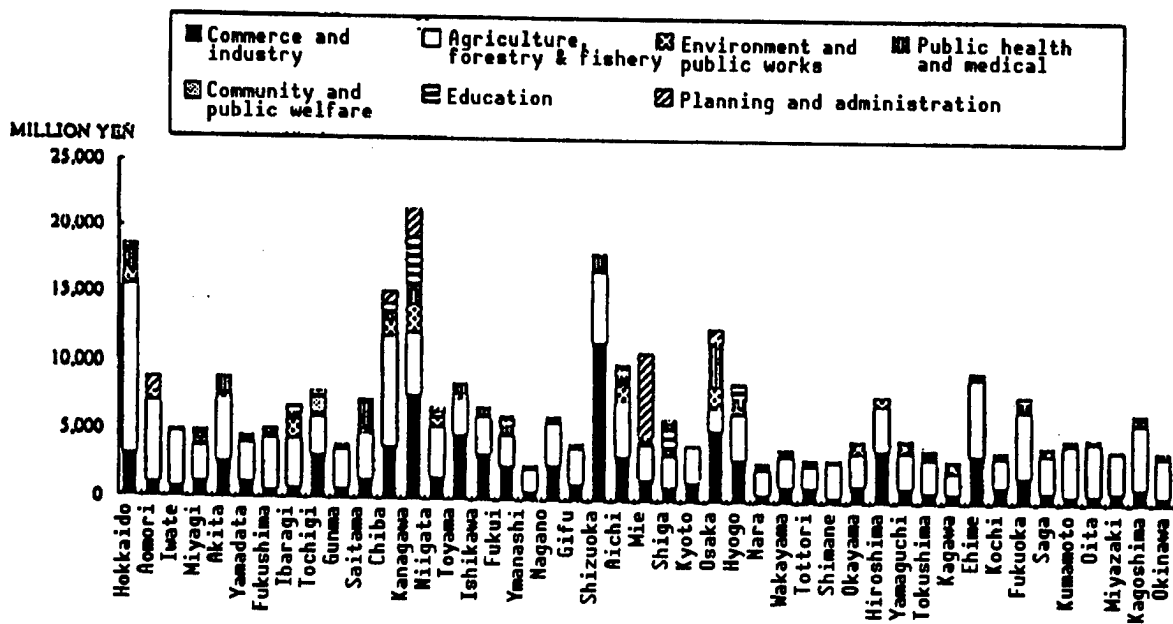


Figure 4-2-6(2). Regular S&T Budget by Prefectural Department (FY1990)

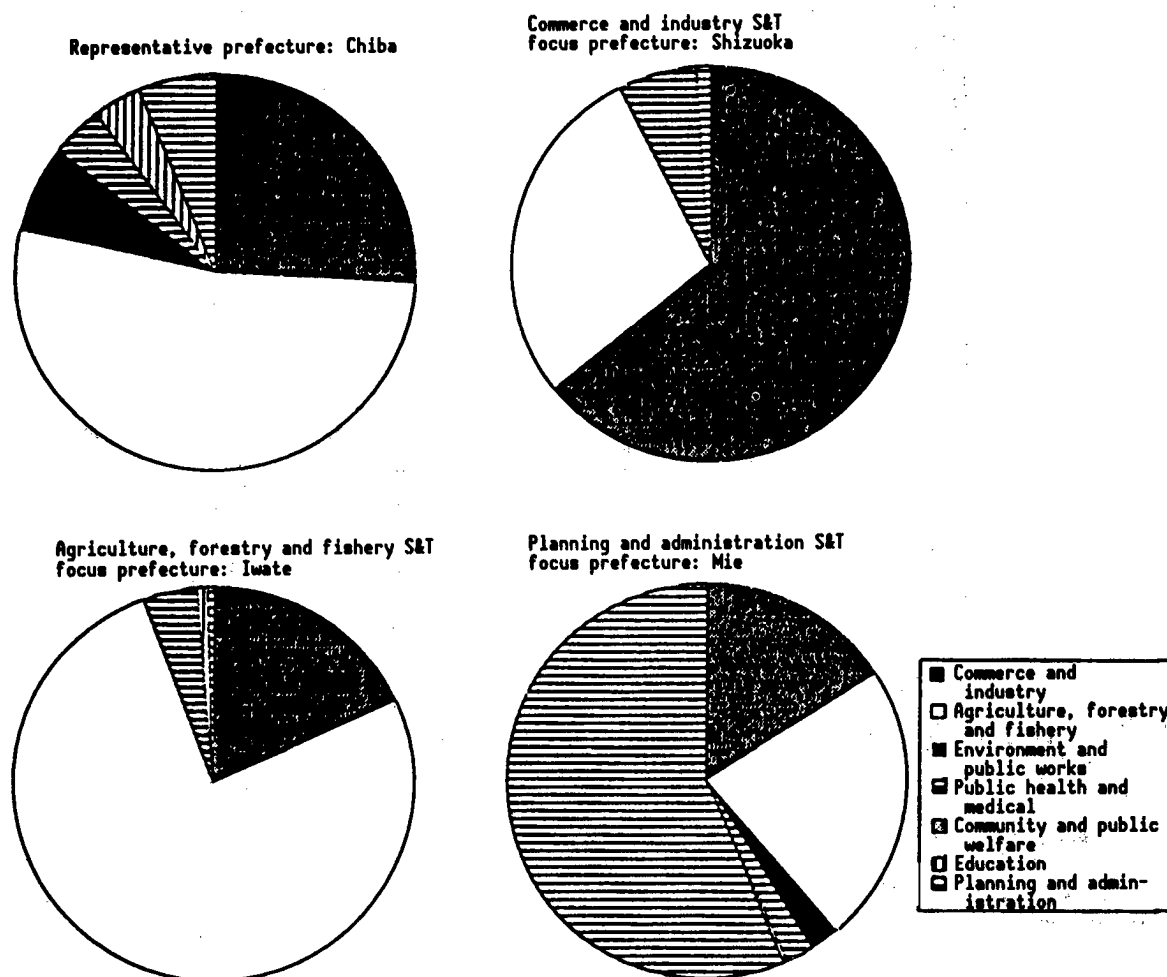
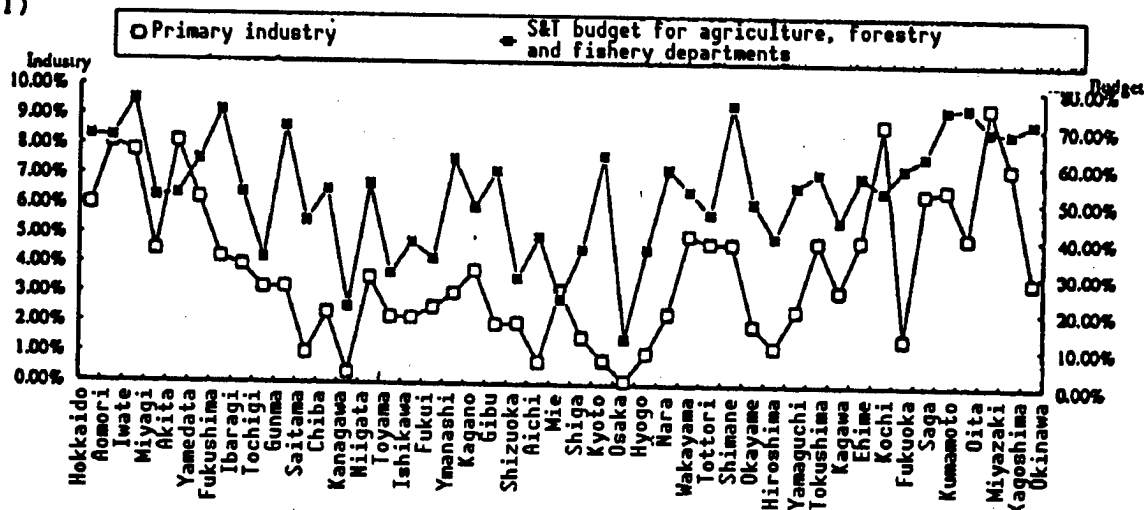


Figure 4-2-7. Distribution of Regular S&T Budget Among Principal Departments

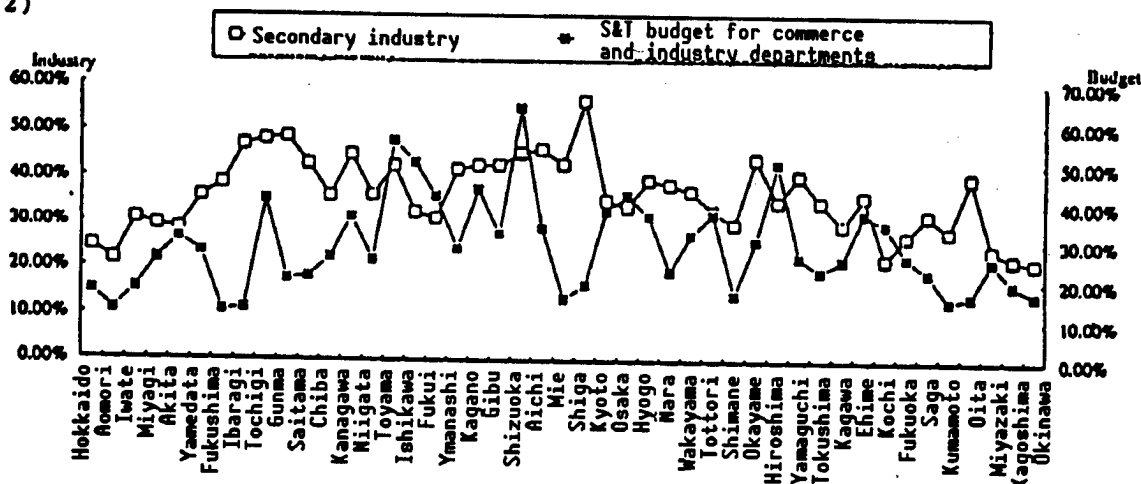
In Figure 4-2-8, we grouped prefectural departments into three parts, "agriculture, forestry and fishery," "commerce and industry," and "others," and compared these group's share of S&T-related budgets with the shares of the "primary," "secondary," and "tertiary" industries in prefectural gross products.¹⁰ We did not detect any basic correlation between these two categories. We present a quartile map of this relation using the median value as the standard.

¹⁰ [We based our analysis on] the FY1989 data in "Outline of Regional Economy, 1992" edited by the Research Bureau, Economic Planning Agency.

(1)



(2)



(3)

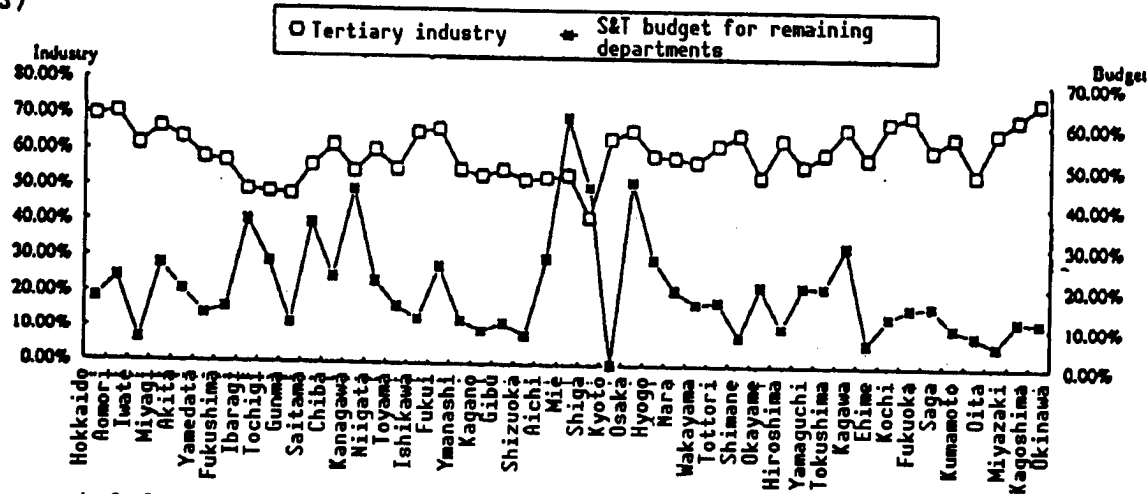


Figure 4-2-8. Primary, Secondary and Tertiary Industry and Prefectural S&T Budgets for Each Department (FY1990, ratios)

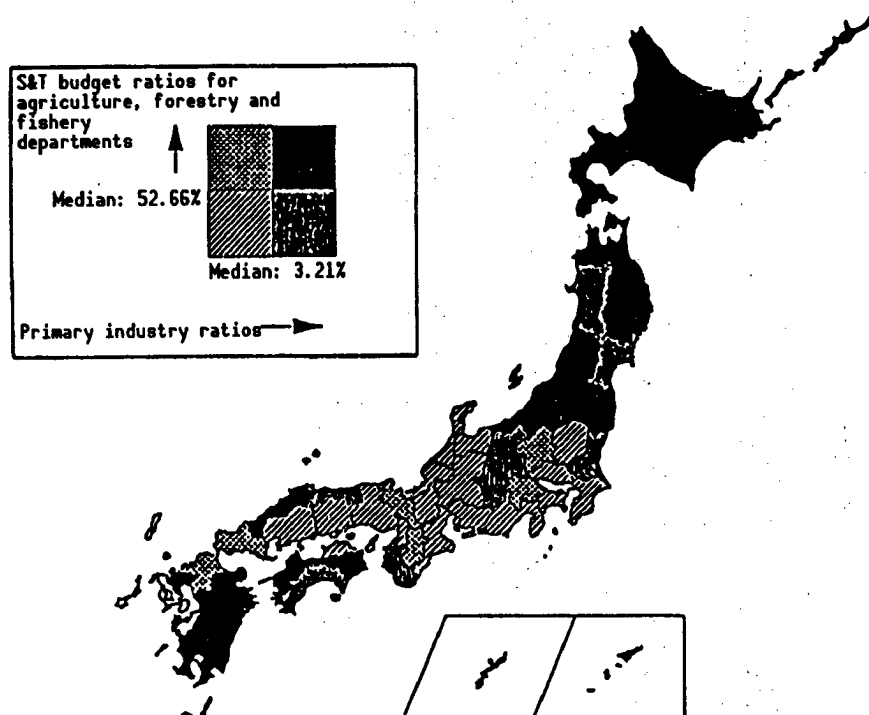


Figure 4-2-9(1). Ratios of Primary Industry and S&T Budgets for Agriculture, Forestry and Fishery Departments by Region

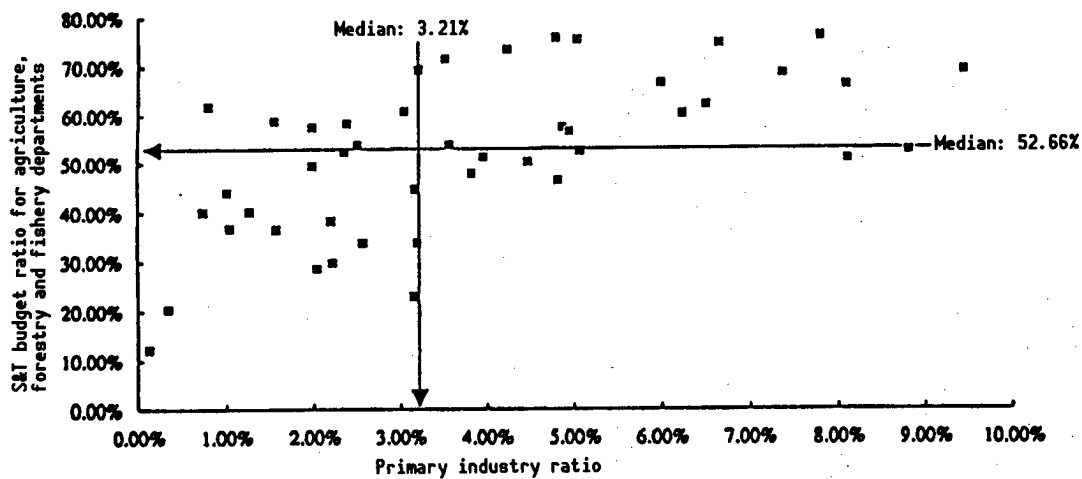


Figure 4-2-9(1-2). Ratios of Primary Industry and S&T Budgets for Agriculture, Forestry and Fishery Departments

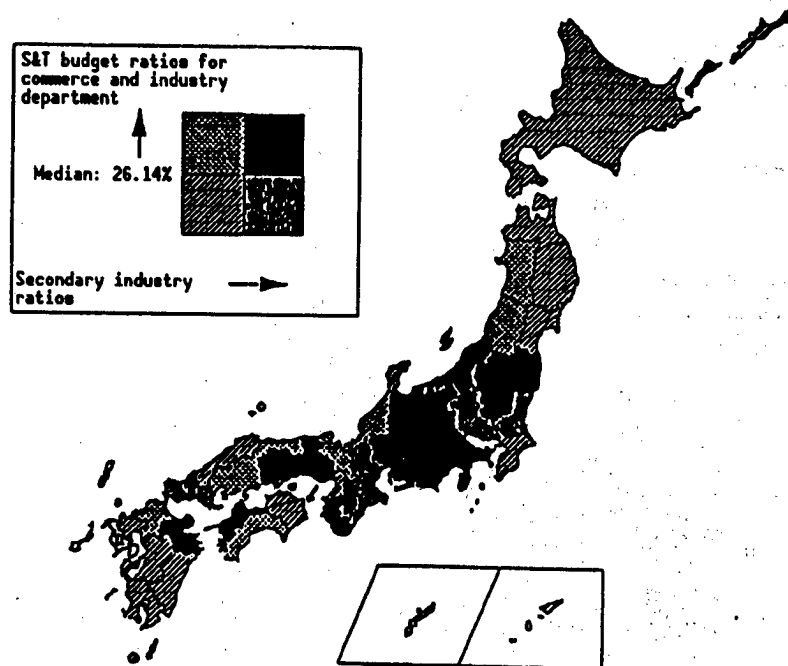


Figure 4-2-9(2). Ratios of Secondary Industry and S&T Budgets for Commerce and Industry Departments by Region

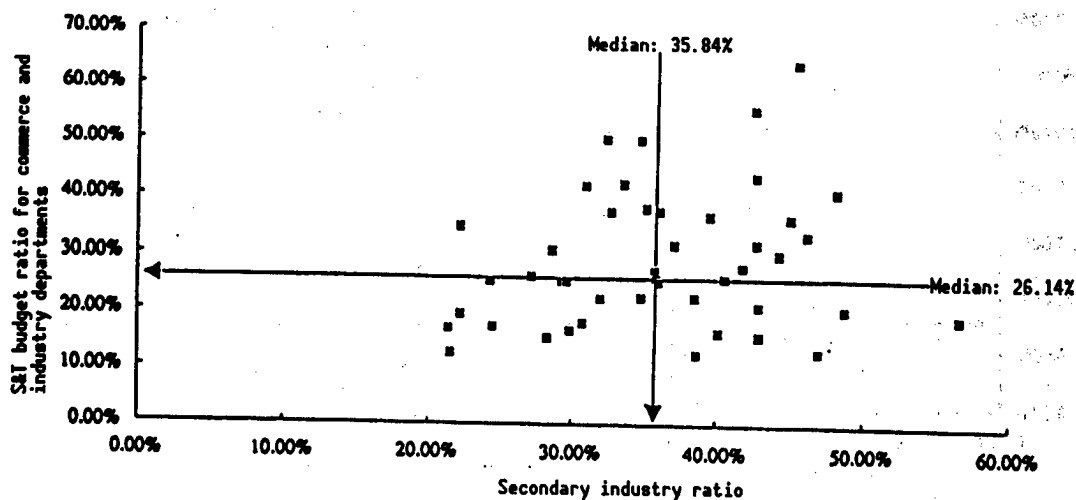


Figure 4-2-9(2-2). Ratios of Secondary Industry and S&T Budgets for Commerce and Industry Departments

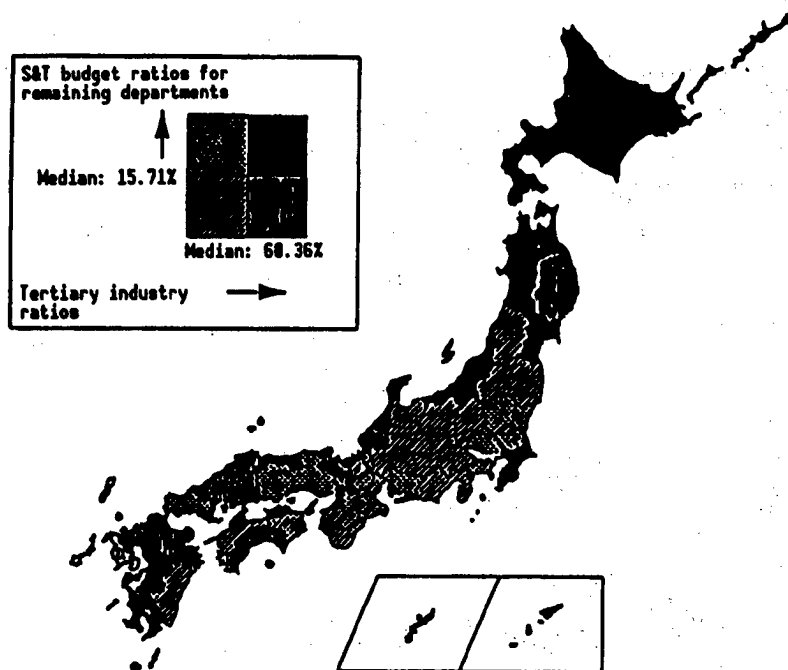


Figure 4-2-9(3). Ratios of Tertiary Industry and S&T Budgets for Remaining Departments by Region

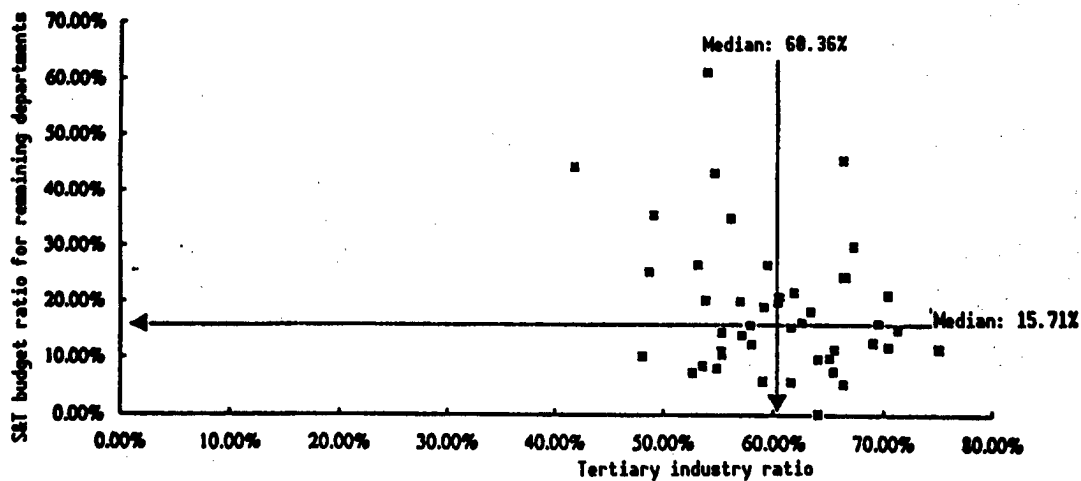


Figure 4-2-9(3-2). Ratios of Tertiary Industry and S&T Budgets for Remaining Departments

5. New Regional S&T Policies

We describe in this chapter regional developments of new S&T policies, classified under four categories—improvement of R&D infrastructures, support of R&D activities, fostering of research manpower and science education and response to internationalization—based on a survey on prefectures and designated cities conducted in January 1992 and another survey in February 1992 on newly established R&D facilities. Although we have studied and analyzed policy developments in prefectures and designated cities as was done in Chapter 4, we also analyzed in Section 5.1 closely related policy implementation by the central government.

5.1 Improvement of R&D Infrastructures

We review in this section the history of the policy implementation by the central government which is closely related to the improvement of regional R&D research infrastructures. We also review the status of newly established R&D facilities and describe their characteristics.

(1) History of the Central Government Implementation and Newly Established R&D Facilities

The history of the central government's policy implementation is a factor that accelerates the improvement of regional R&D infrastructures. Starting with the Law to Promote Regional Development of Advanced Technology Industrial Centers (The Technopolis Law) adopted in 1983, various measures to accelerate regional development of R&D facilities have been implemented by a number of central government agencies (Table 5-1-1).

The policy measures listed in the above table not only accelerate a nationwide distribution of R&D facilities [financed by the central government] but also are accompanied by investments and participation of regional governments and foundations.

At the same time, independent improvements of regional R&D infrastructures, such as improving public research institutions and establishing R&D facilities, have been carried out.

Since 1984 (after the Technopolis Law was enacted), 81 of the newly established R&D facilities were financed by regional governments and foundations (in 37 prefectures) (Table 5-1-2).¹¹

Among them, 47 facilities established by the central government are located in 27 prefectures, distributed as illustrated in Figure 5-1-1.

¹¹ The data for facilities established by the central government were collected from published data and hearings held at the relevant government agencies, while the data for facilities established by regional governments and foundations were collected from published data and hearings held at regional governments and foundations.

Table 5-1-1. List of Central Governmental Policies for Establishing Regional R&D Facilities

Year	Policy implementation	Government agency in charge	Relevant laws and ordinances
1983	Technopolis	MITI	Law to promote regional development by concentrating advanced technology and industries (the Technopolis Law)
1985	Promote basic technology research	MITI, the Ministry of Posts and Telecommunications	Law to facilitate basic technology Research
1986	Research core	MITI	Law for temporary measures to promote the improvement of specified facilities by utilizing the private sector capabilities
1986	Biological research organization	The Ministry of Agriculture, Forestry and Fisheries	Law for an organization to promote research on bioindustrial technology
1987	Funds for medicine	Ministry of Health and Welfare	Relief funds law for victims of side effects of medicine
1988	Establishing intelligent sites	MITI	Law to accelerate the concentration of specified enterprises that contribute to advanced regional industries (Intelligent Site Law)
1988	Improvement of pioneering and basic regional S&T facilities	STA	Law to promote the establishment of multicentral, dispersed nation
1988	Projects to improve infrastructures for industrial technology research	MITI	Law to improve R&D systems for industrial technology (Industrial Technology Law)

Table 5-1-2. Research and Support Facilities Funded by Local Governments and Established Since 1984

Policy im- plementation	No. of facilities	Prefecture	Facility
Promotion of basic R&D	1	Osaka	Basic Information System Development, Inc.
Research core	11	Hokkaido Miyagi Ibaraki Kanagawa Niigata Toyama Aichi Osaka Hyogo Fukuoka Fukuoka	Eniwa Research Business Park, Inc. Miyagi Techno Plaza, Inc. Tsukuba Research Support Center, Inc. KSB, Inc. Nagaoka Research Core (Shinanogawa Technopolis Develop- ment Foundation) Toyama Prefecture Center To Create Industries (Found.) Science Create Foundation Chisato Life Science Center, Inc. EHRIC [phonetic], Inc. Kurume Research Park, Inc. Fukuoka Soft Research Park, Inc.
Bioresearch reorganiza- tion	11	Hokkaido Aomori Iwate Iwate Yamagata Tokyo Metropolis Wakayama Ehime Nagasaki Kagoshima Okinawa	Hokkaido Green Bioresearch Institute, Inc. Saccharic Chain Engineering Research Institute, Inc. Fish Farming Technology Research Institute for Cold Water, Expensive Fish, Inc. Iwate Biomass Research center, Inc. Functional Peptide Research Institute, Inc. Seedling Nursery Research Institute for Processed Rice, Inc. Wakayama Agribio Research Center, Inc. Kelp Resource Research Institute, Inc. Seatechs, Inc. Okinoerabu Bulb Root Bioresearch Institute, Inc. Okinawa Orchid Research Institute, Inc.
Intelligent sites	15	Aomori Ibaraki Gunma Ishikawa Toyama Shizuoka Wakayama Tottori Okayama Hiroshima Tokushima Fukuoka Oita Kagoshima Okinawa	Hachinohe Intelligent Plaza, Inc. Hitachinaka Techno Center, Inc. Gunma Industrial Advancement Center, Inc. Ishikawa Trial Center (Ishikawa Prefectural Foundation for Industrial Promotion Fund) Toyama Prefecture Comprehensive Information Center, Inc. Hamanago Intelligence Center, Inc. Wakayama Research Laboratory, Inc. Center To Create New Industries, Inc. Okayama Prefecture Foundation To Promote New Technologies Advanced Technology Joint Research Center (Hiroshima Techno-Plaza Foundation) Tokushima Health Science Comprehensive Center, Inc. Kitakyushu Techno Center, Inc. Oita Prefecture Advanced Technology R&D Institute (foundation) Kagoshima Intelligence Center, Inc. Tropical Techno Center, Inc.
Improvements of pioneer- ing, basic regional S&T facilities	9	Hokkaido Hokkaido Iwate niigata Gifu Gifu Shizuoka Osaka Yamaguchi	Underground No-Gravity Experimental Center, Inc. Ohtsuku Drifting Iceberg Science Research Institute, Inc. Research Center for Technologies Utilizing Mining Industry and Marine Organs, Inc. Laser Application Engineering Center, Inc. Japan Ultrahigh Temperature Materials Research Center, Inc. Japan Weightless Comprehensive Research Institute, Inc. Research Center for Technologies Utilizing Mining Industry and Marine Organs, Inc. Ion Engineering Center, Inc. Research Center, Inc.

[Continuation of Table 5-1-2]

Policy im- plementation	No. of facilities	Prefecture	Facility
Public research institutions	34	Hokkaido	Food Processing Research Center
		Hokkaido	Hokkaido Prefectural Industrial Technology Center (Technopolis Hakodate Technology Promotion Foundation)
		Hokkaido	Muroran Techno Center (Foundation)
		Aomori	Agricultural product Processing Guidance Center
		Iwate	Bioengineering Research Institute
		Akita	Advanced Technology Research Institute
		Akita	Bioengineering Research Institute Attached to the Prefectural Agricultural Junior College
		Akita	Bioresource Comprehensive Development and Utilization Center
		Akita	Metal Industry Technology Training Center (Akita Prefecture Resource Technology Development Foundation)
		Akita	Comprehensive Food Research Institute
		Akita	Advanced Lumber Processing Research Institute
		yamagata	Advanced Technology R&D Center
		Saitama	Saitama Industrial Business Park
		Chiba	Kazusa DNA Research Institute (Foundation)
		Tokyo	Food Technology Center
		Metropolis	
		Kanagawa	Kanagawa Science and Technology Academy
		Kanagawa	Kanagawa Advanced Technology Support Foundation
		Nagano	Ina Technology Formation Center
		Aichi	Japan Fine Ceramics Center Foundation
		Mie	International Environmental Technology Transfer Research Center Foundation
		Kyoto	Kyoto Advanced Technology Research Foundation
		Osaka	New Industrial Technology Comprehensive Research Institute
		Osaka	Osaka Bioscience Research Foundation
		Hyogo	Advanced Technology R&D Center
		Okayama	Biotechnology Research Institute
		Okayama	Okayama Ceramics Center (Okayama Ceramics Technology Promotion Foundation)
		Yamaguchi	Marine Fishery High-Technology Center
		Yamaguchi	Environmental High-Technology Research Center
		Ehime	Ehime Technopolis Foundation
		Saga	Morodomi Design Center
		Oita	Bioengineering Research Institute
		Oita	Hyper-Networked Society Research Foundation
		Kumamoto	Electronics Application Technology Research Institute
		Kagoshima	Kagoshima Prefecture Biotechnology Research Institute
Total	81		

(2) Characteristics of Newly Established Regional R&D Facilities

Based on a survey of R&D facilities newly established since 1984 which employ their own researchers (including those not funded by local governments and foundations),¹² the main characteristics of these facilities are listed below. This survey was conducted in February 1992 (questionnaires sent to 94

¹² Organizations to be surveyed were identified by the same method as stated in Footnote 5.1.

facilities, 48 facilities replied) (Table 5-1-3—This table includes the results of questionnaires sent to public research institutions, as described in detail in Chapter 8).

The average number of employees is 23.1 persons, the average number of researchers is 15.67 persons, the average age of researchers is 37.73 years old. These numbers indicate that the regional facilities are relatively small and staffed by young researchers. The distribution of the total number of employees, researchers and technicians is shown in Figure 5-1-2.

Of the researchers, 15.0 percent hold doctorates, and a total of 28 foreign researchers were working in 12 facilities (25.0 percent) among the 48 facilities that replied. Of these, five facilities had foreigners working as regular employees.

Concerning measurement and testing equipment, 20.0 percent of the facilities owned equipment that cost ¥100 million or more, while 84.4 percent of the facilities owned equipment that cost ¥10 million or more but less than ¥50 million.

Meanwhile, a few facilities (11 facilities, or 22.9 percent) hired new graduates as researchers, while most facilities (41 facilities, or 87.5 percent) hired researchers from other organizations, mostly from the private sector (Table 5-1-4).

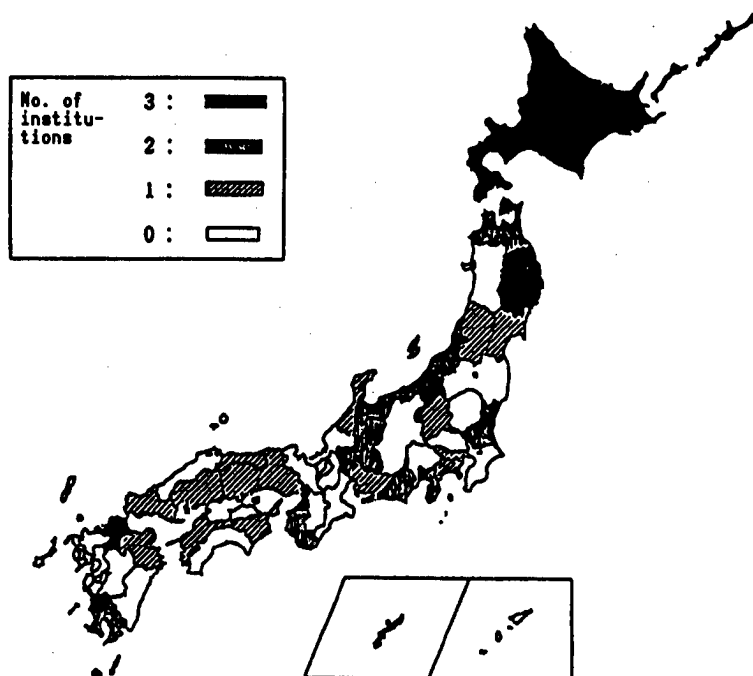


Figure 5-1-1. Distribution of Research and R&D Support Institutions by Region Established Since 1984 (as part of National Policy)

Table 5-1-3. Features of Newly Established R&D Institutions

Item		Average	Public research institutions
No. of staff	Total	23.10 persons	39.44 persons
	In research section	17.69	32.02
	Researchers	15.67	24.47
	Technicians	5.00	10.56
Age structure	Less than 25 years	4.21 %	4.7
	25~35 years	44.88	27.4
	35~45 years	25.75	30.8
	45~55 years	15.63	26.41
	More than 55 years	9.94	10.58
Average age		37.73 years old	40.75 years old
Structure of school career	Doctorate graduates	15.00%	1.89%
	Master's graduates	27.04	14
	University graduates	47.48	67.74
	Junior college graduates	10.27	16.77
No. of researchers with doctorates		3.28 persons	1.58 persons
Average salary (30-year-old researcher, annual, before tax)	¥3 million or less	0 institutions	4 institutions
	¥300~350 million	5	27
	¥350~400 million	4	91
	¥400~450 million	15	198
	¥450~500 million	6	90
	¥500~550 million	6	19
	¥550~600 million	3	4
	¥600 million or more	5	0
Foreign researchers	Staying less than 3 months	1 institutions total 2 people	7 institutions total 13 people
	Staying 3 months□ less than 1 year	5 13	31 39
	Staying 1 year~ less than 2 years	4 7	2 2
	Regularly employed	5	0
		6	0
Institutions hosting foreign researchers		12 institutions total 28 people	36 institutions total 66 people
Measurement & examination instruments	¥10~50 million	84.44%	64.57%
	¥50~100 million	26.67	10.77
	¥100 million or more	20.00	4.95
Cooperative research	Less than 5 cases	37.50%	33.90%
	5~9 cases	14.58	11.23
	More than 10 cases	2.08	5.30
	0 case and N.A.	45.83	49.58
	Conducting institute	4.33 cases	4.31 cases
	Responding institute	3.36 cases	3.10 cases

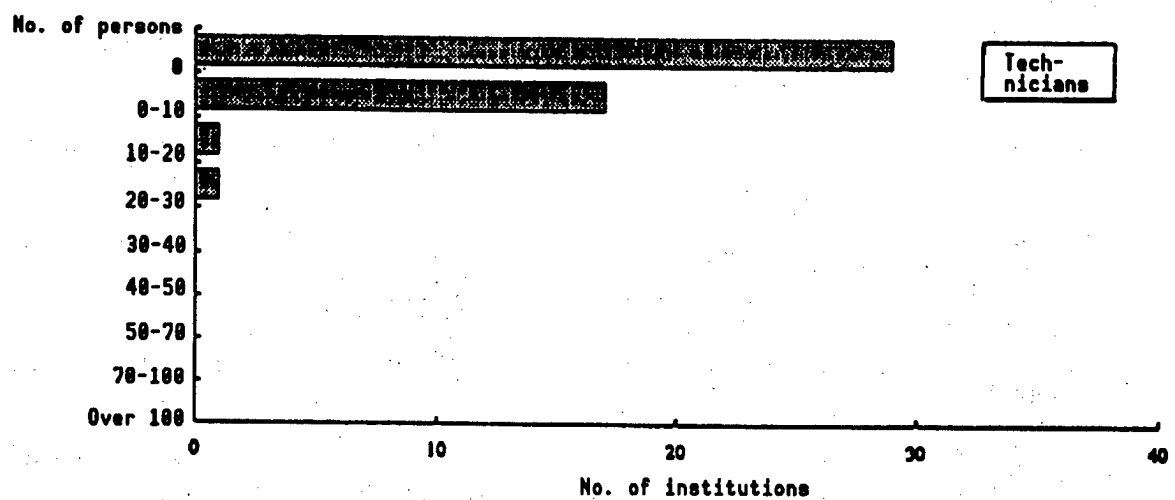
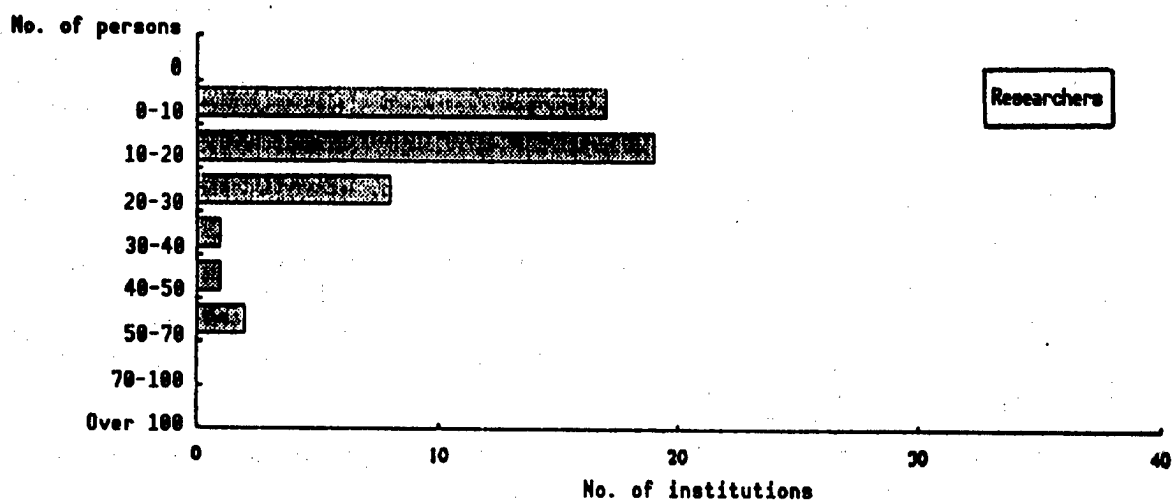
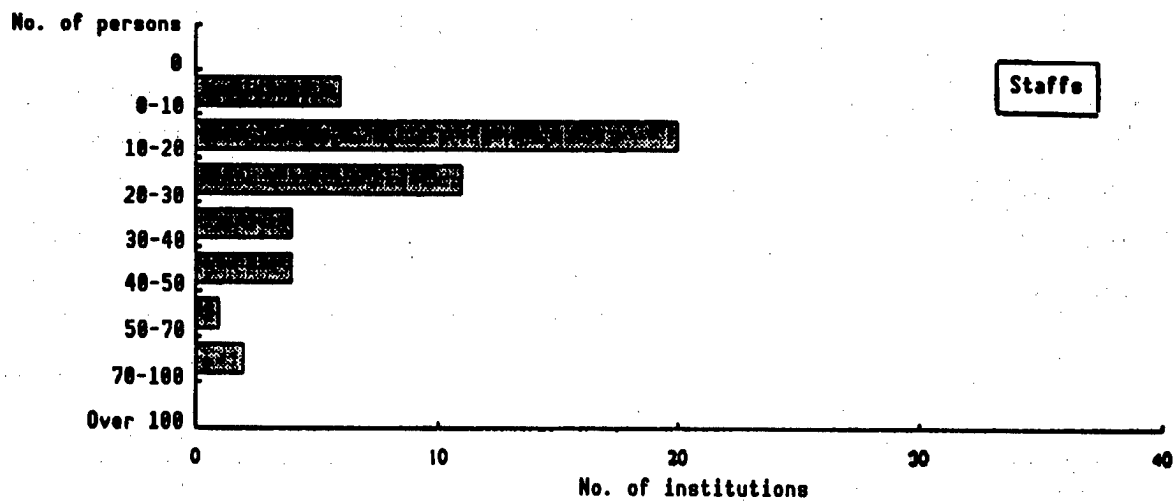


Figure 5-1-2. Distribution of Number of Staff in Newly Established R&D Institutions

Table 5-1-4. Origin and Number of Researchers in Newly Established R&D Institutions

Researchers employment status	Persons										No. of institutions	
	1	2	3	4	5	6	7	8	9	10	Total	%
Newly graduated	2	3	5		1						11	22.92
From other institutions	2			4	1	6	3	4	4	18	42	87.50
National research institutions	4	1									5	10.42
Public research institutions	2	1	2				1				6	12.50
Universities	3	3	1	1	2						10	20.83
Private corporations	5	3	4	2		2	2	1	1	16	36	75.00
Collaboration partners											0	0.00
Government-affiliated special corporations	4			2	1	1					8	16.67
Other	3	2		2					1	2	10	20.83

5.2 Support for R&D Activities

We describe in this section R&D support activities (except for indirect support by foundations and the third sector) provided by prefectures and designated cities to local businesses and research facilities. Our presentation is based on a survey (45 prefectures and 7 designated cities replied) conducted in January 1992.

This survey was conducted on the status of eight types of support activities. The replies were:

- Technical consultation and guidance to local businesses: 51 local governments (with total budgets of about ¥1.5 billion);

- Support advancement and technology development of local businesses: 49 local governments (with total budgets of about ¥5.9 billion);

- Promote research exchange in the private sector: 49 local governments (with total budgets of about ¥800 million);

- Research exchange among industrial, academia and government [research facilities] (joint research, etc.): 45 local governments (with total budgets of about ¥2.9 billion);

- Support invitation to and fostering of R&D-type businesses: 35 local governments (with total budgets of about ¥13.5 billion);

- Provide S&T information (systems to interact beyond regional facilities): 34 local governments (with total budgets of about ¥400 million);

Table 5-2-1. List of R&D Support Budgets by Prefectures and Specified Cities* (FY1990, ¥1,000)

Prefectures and specified cities	Technological advice and guidance for local firms	Support to technological development and advancement of local firms	Promotion of research interaction (industry-academia-government)	Support to research interaction (industry-academia-government)	Invitation or incubation of R&D firms	Offer of S&T information (external system)	Expenditure to central government research institutions	Research subsidies to medical institutions	Total
Hokkaido	89,611	154,436	12,530	146,776	81,973	91,948			527,961
Homori	9,963	10,000	6,252	30,309	0		200		56,724
Iwate	23,294	104,010	63,303	87,646	104,010	13,290	26,426	20,000	337,971
Miyagi	36,379	45,379	1,524	176,621	0	315	5,973		266,400
Akita	17,631	80,021	1,500	91,898	0	337		1,084,690	1,276,097
Yamagata	14,120	16,000	64,816	125,393	0		250		220,579
Fukushima	0	0	51,708		0	2,968	300	95,314	150,290
Ibaraki	14,787	1,740	53,352	3,000	0	3,482		45,000	121,361
Tochigi	5,788	432,460	6,610	283,319	937	4,317	472		733,903
Gunma	18,769	21,568	0	0	11,495				51,832
Saitama	24,991	116,928	36,812	174,834	0				353,563
Chiba	7,972	100,000	3,296	17,857	20,000	24,293	800		154,218
Kanagawa	39,684	265,620	101,195	58,134	48,500	2,915			536,048
Niigata	7,236	82,830	1,217	53,802	368,057	2,784			515,928
Ioyama	1,154	32,990	42,700	123,439	3,101,286	9,974			3,311,543
Ishikawa	13,098	120,716	5,000	43,716	145,000	58,469	400		386,399
Fukui	20,645	40,000	6,044	230,853	715,427		28,096		1,041,063
Yamanashi	31,298	0	3,483	3,483	0				38,264
Nagano	23,137	77,000	3,000	0	0	70,362	400		173,899
Gifu	25,157	88,553	2,023	8,838	0	1,382			125,753
Shizuoka	30,442	311,350	6,564	200,000	193,926	17,940	3,000	44,862	607,946
Aichi	49,500	18,940	4,539	42,228	200,000		2,375		317,532
Mie	9,222	44,112	20,000	0	4,590,977		89,000		4,719,311
Shiga	51,607	13,849	2,362	2,000	5,478	2,920	1,000		73,738
Kyoto	20,619	80,800		68,429	0	6,000			175,848
Osaka	0	59,303	122,388	54,600	0	8,029	30,000		274,320
Kyogo	24,180	66,961	2,500	125,000	27,500			0	246,141
Nara	13,260	48,450	6,000	1,200	0	215			69,125
Wakayama	9,244	16,000	5,046	6,513	0	6,634	1,320		44,757
Tottori	6,092	15,400	20,820	13,897	200,000	1,583	5,071		262,863
Shimane	9,115	20,000	600		0	9,214			38,929
Okayama	10,214	146,000	26,084	35,000	478,064	3,647			220,943
Hiroshima	24,213	99,932	33,454	9,502	0		300	26,187	193,588
Yamaguchi	20,914	331,452	4,014	125,504	0	0			481,914
Iokushima	6,500	10,000	3,000		0				19,500
Kagawa	8,970	29,895	1,520	50,964	26,080	2,314			103,643
Ehime	14,321	49,719	3,014	91,857	2,724,940	359	7,770		2,892,010
Kochi	18,907	34,004	3,033	29,591	0	1,013			86,530
Fukuoka	14,641	33,000	3,044	2,120	7,071	4,782			64,638
Saga	9,284	50,000	14,000	67,280	15,000				155,564
Kumamoto	0	60,000	4,064	77,730	0	7,875	20,150		169,879
Oita	17,296	40,300	28,195	3,241	6,700	5,252	10,000		110,984
Miyazaki	5,865	11,000	1,487		0				18,352
Kagoshima	22,817	169,472	2,023	15,551	35,986	2,385			248,234
Okinawa	5,344	11,000	2,360	3,383	0				22,089
Subtotal	847,301	3,570,950	786,542	2,685,517	13,108,407	367,160	233,253	1,316,053	21,998,240
Sendai	800,000	13,200	0	175,000	16,890		50,000		841,950
Kawasaki		100,000			0				100,000
Kyoto	16,697	2,111,128			3,600	0	8,226		2,139,651
Osaka	10,109	77,900	3,616	3,671	228,126			84,238	407,660
Kobe	3,257	2,100	2,591	1,491	10,897				20,350
Hiroshima	1,327	0	2,063		0		1,100		4,492
Kitakyushu	11,946	47,563	500	200	152,186	0	1,826		214,243
Subtotal	643,356	2,351,893	8,779	180,429	411,699	0	61,152	84,238	3,728,346
Total	1,490,657	5,922,843	795,321	2,865,946	13,520,106	367,160	294,407	1,400,291	25,726,586

The total of each prefecture and city is not equal to the sum of items because of double classification.
*Cities which have higher governability than ordinary cities, designated by a government ordinance.

Contribute to funding of national research facilities: 25 local governments (with total budgets of about ¥300 million;

Research subsidy to medical facilities: 8 local governments (with total budgets of about ¥1.4 billion).

(See Table 5-2-1. For the listing of the actual projects, see Tables 1-7 in Appended Data.)

The total budgets used for the above eight activities amount to about ¥25.7 billion, or 8.0 percent of the total S&T budget (regular budget). In addition, 15 local governments reported a total of about ¥33.1 billion (9.5 percent of total S&T budgets) in loans for "supporting advancement and technology development of local businesses" and "inviting and fostering R&D-type businesses."

5.3 Training Research Personnel and Science Education

In this section, we describe the status of policy implementations on training research personnel and science education (public education and dissemination of S&T) based on a survey of prefectures and designated cities conducted in January 1992 among (45 prefectures and seven designated cities replied) as was done in Section 5.2.

(1) Training Research Personnel

We surveyed two categories, "training specialists," and "training young (35 years old or under) researchers."

We have received affirmative replies from almost all prefectures about "training specialists" but only 21 local governments (40.4 percent of the total) responded to "training young researchers."

For these two categories, the total budget was about ¥15.8 billion, or 4.5 percent of the total (regular) S&T-related budget (Table 5-3-1).

The activities of manpower training projects included:

- For private enterprises: Carry out training activities, such as training and ORT [expansion unknown];

- Receive research trainees at public research institutions;
 - Jointly hold open lectures at universities;
 - Subsidize training facilities; and
 - Subsidize training projects of private firms (such as sending trainees to research facilities).

- For administrative staff: Send staff to universities, training facilities, and private firms;

- Conduct internal training; and
 - Invite guest researchers.

Table 5-3-1. List of Human Resource Development Promotion Budgets by Prefectures and Specified Cities* (FY1990, ¥1,000)

Prefectures and specified cities*	Human resource development for experts	Human resource development of younger researchers	Total
Hokkaido	1,200,563	12,718	1,213,281
Aomori	37,896	896	37,896
Iwate	22,306	2,500	22,306
Miyagi	17,223	3,947	21,170
Akita	2,948	2,800	5,748
Yamashita	34,326	2,263	36,791
Fukushima	54,157	1,490	55,647
Ibaragi	6,939		6,939
Tochigi	2,102	5,000	7,102
Gunma	34,091		34,091
Saitama	110,174		110,174
Chiba	2,932,850	297	2,933,147
Kanagawa	3,336,291		3,336,291
Niigata	25,582	0	25,582
Toyara	2,327		2,327
Ishikawa	20,681	0	20,681
Fukui	35,700		35,700
Yamanashi			0
Nagano	47,061		47,061
Gifu	11,499	2,666	14,165
Shizuoka	64,253		64,253
Aichi	475,824		475,824
Mie	5,860		5,860
Shita	24,192		24,192
Kyoto	18,468	4,000	22,468
Osaka	2,645,510		2,645,510
Hyogo	387,593		387,593
Nara	8,998		8,998
Wakayama	196,216		196,216
Tottori	522		522
Shimane	7,397		7,397
Okayama	7,218	17,024	24,242
Hiroshima	2,350,519		2,350,519
Yamaguchi	24,994		24,994
Tokushima	382,348		382,348
Kagawa	656		656
Ehime	17,840	12,104	29,944
Kochi	578,542	176	578,718
Fukuoka	59,618	1,600	61,218
Saga	7,000	2,439	9,439
Kumamoto	90,142		90,142
Oita	46,639		46,639
Miyazaki	9,870		9,870
Kagoshima	478		478
Okinawa	161,428		161,428
Subtotal	15,507,041	71,922	15,575,567
Sendai	132,000		132,000
Kawasaki	0		0
Kyoto	23,692		23,692
Osaka	1,033	6,748	7,783
Kobe	37,130	798	37,928
Hiroshima	6,370	1,123	7,493
Kitakyushu	12,392		12,392
Subtotal	212,619	8,671	221,290
Total	15,719,660	80,593	15,796,857

Total of each prefecture and city is not equal to sum of items because of double classification.
[Specified cities note on previous page]

Table 5-3-2. List of Public Understanding and Promotion Budgets by Prefectures and Specified Cities* (FY1990, ¥1,000)

Prefectures and specified cities*	Promotion of understanding and acceptance of citizens	Promotion of S&T education (younger generation, life-long)	Scientific museums	Total
Hokkaido	4,436	1,000		5,436
Aomori	120,476	7,054		127,530
Iwate			31,690	31,690
Miyagi	7,170	2,638		9,808
Akita	200	6,100	0	6,300
Yamagata	500	7,756	187,553	195,809
Fukushima	11,241	0	292,452	303,693
Ibaraki			555,710	555,710
Tochigi	605,238	596,547	453,389	1,655,174
Gunma		29,440		29,440
Saitama	3,028	13,500	87,521	104,049
Chiba	72,337	605,378	214,044	677,715
Kanagawa	18,219	1,497,445	2,306,176	3,821,840
Niigata	0	608	469,031	469,639
Toyoake		0	1,800	1,800
Ishikawa			400	400
Fukui	91,301		365,342	456,643
Yamanashi				
Nagano				
Gifu				
Shizuoka				
Aichi	140	12,627	185,110	197,877
Mie		24,060		24,060
Shiga	5,445	5,045	1,762,156	1,772,646
Kyoto				
Osaka	3,983	2,816	1,500	8,299
Hyogo		208,831	822,404	1,031,235
Nara	1,362			1,362
Wakayama			178,901	178,901
Tottori	10		293,889	293,899
Shimane				
Okayama			50,728	50,728
Hiroshima				
Yamaguchi	0		241,897	241,897
Tokushima		2,782	276,708	279,490
Kagawa		98		98
Ehime		19,289	45,792	65,081
Kochi		3,430	40,000	43,430
Fukuoka	10,592	391,368	388,718	401,960
Saga		3,200	1,793	4,993
Kumamoto	2,906			2,906
Oita		572		572
Miyazaki				
Kagoshima	8,496	15,363	172,497	196,356
Okinawa		5,984		5,984
Subtotal	967,080	3,462,931	9,427,203	13,254,452
Sendai		30,885	2,821,238	2,852,123
Kawasaki		3,156		3,156
Kyoto	958	66,967	164,479	232,404
Osaka		0	382,898	382,898
Kobe			0	0
Hiroshima				0
Kitakyushu	450	51,850	65,736	118,036
Subtotal	1,408	152,858	3,434,351	3,588,617
Total	968,488	3,615,789	12,861,554	16,843,069

Total of each prefecture and city is not equal to sum of items because of double classification. *Cities which have higher governability than ordinary cities, designated by a government ordinance.

Goals of these projects not only covered learning basic theories and advanced technologies, but also reaping some short-term achievements. Industries covered by these programs were diverse. (See Tables 8 and 9 of the Appendix for the description of these training activities.)

(2) Public Education and Dissemination of S&T

We surveyed three categories in this study: "Fostering the understanding of S&T by local residents," "strengthening S&T education (young generation, continued [adult] education)," and "natural science museums." Replies to each category were:

Fostering the understanding by local residents: 23 local governments (approximately ¥1 billion in budgets)

Strengthening S&T education: 32 local governments (approximately ¥3.6 in budgets)

Natural science museums: 32 local governments (approximately ¥12.9 billion in budgets).

This particular survey is notable for its paucity for replies (Table 5-3-2).

The combined total budget of these three categories amounted to approximately ¥16.8 billion, or 4.8 percent of the total (regular) S&T-related budget.

The actual activities under "fostering the understanding by local residents" included:

- Public relations through publications;
- Hold open house events for [public] research facilities;
- Present research results to local residents;
- Hold public lectures and seminars; and
- Exhibit development technologies.

See Tables 10 and 11 of the Appendix for the actual activities carried out for "fostering the understanding by local residents," and "strengthening S&T education."

On the other hand, there are a total of 799 museums in Japan as of 1 October 1990 according to "Handbook of Educational Statistics (1992 edition)." Of these, 81 are science museums (10.1 percent) (Table 5-3-3. General museums included in the table contain natural science exhibits. Science museums form only part of natural science museums.).

Twenty-two natural science museums under 21 local governments replied to this survey (Table 5-3-4).

Table 5-3-3. Number of Museums (1 October 1990)

Classification	National	Public	Private	Total
General museums	3	76	17	96
History museums	4	138	116	258
Art museums	2	91	159	252
Science museums	8	42	31	81
Outdoor museums	1	3	7	11
Zoo, botanical garden, etc.	10	37	54	101
Total	28	387	384	799

Table 5-3-4. Sample List of Natural Science Museums
(Includes only those replying to survey)

Museum name	Prefecture or city[C]	Estab- lished
Iwate Prefectural Marine Science Museum	Iwate	1986
Mining Science Museum attached to the Mining Faculty, Akita University	Akita	1951
Yamagata Prefectural Museum	Yamagata	1971
Fukushima Prefectural Museum	Fukushima	1986
Tochigi Prefectural Museum	Tochigi	1982
Saitama Prefectural Nagatoro Natural History Museum	Saitama	1981
Niigata Prefectural Natural Science Museum	Niigata	1981
Fukui Prefectural Nature Sanctuary Center	Fukui	1990
Fukui Prefectural Museum	Fukui	1984
Wakayama Prefectural Natural History Museum	Wakayama	1982
Tottori Prefectural Museum	Tottori	1972
Okayama Prefecture Technology Promotion Center (New Science Museum)	Okayama	1985
Yamaguchi Prefectural Yamaguchi Museum	Yamaguchi	1917
Tokushima Prefectural Museum	Tokushima	1990
Ehime Prefectural Museum	Ehime	1959
Fukuoka Prefecture Youth Science Museum	Fukuoka	1990
Kagoshima Prefectural Museum	Kagoshima	1953
Sendai Municipal Science Museum	Sendai [C]	1990
Kyoto Municipal Youth Science Center	Kyoto [C]	1969
Osaka Municipal Natural History Museum	Osaka [C]	1950
Kobe Municipal Youth Museum	Kobe [C]	1984
Kitakyushu Municipal Transportation Science Museum	Kitakyushu [C]	1985

Table 5-3-5. Planned Natural History Museums

(Scheduled establishment)

Museum name	Prefecture	Established
Ibaraki Prefecture Natural History Museum (tentative name)	Ibaraki	1994
Arakawa General Museum	Saitama	1996
Saitama Science Creation Park	Saitama	1997
Modern Industry and Science Museum (tentative name)	Chiba	1994
Kanagawa Prefectural Natural History Museum (tentative name)	Kanagawa	1995
Sea of Japan Museum (tentative name)	Toyama	1996
Natural Science Museum (tentative name)	Ishikawa	—
Biwa-ko Museum (tentative name)	Shiga	1995
Museum for Man and Nature (tentative name)	Hyogo	1992
Ehime Prefectural General Science Museum	Ehime	1991
Kochi Prefectural Forestry Science Museum	Kochi	1992
Space Museum (tentative name)	Saga	—

5.4 Response to Internationalization

In this section, we describe responses to the internationalization of S&T based on a survey of local governments (45 prefectures and seven designated cities replied) conducted in January 1992.

In this study, we surveyed two categories, "improvements of international exchange infrastructures" and "promotion of international exchange including support for foreign researchers." Replies indicated that (a total of 25) local governments spent the following amounts:

Improvements of international exchange infrastructures: 10 local governments spent approximately ¥14.6 billion; and

Promotion of international exchange: 18 local governments spent approximately ¥900 million.

"Improvements of international exchange infrastructures" included diverse activities such as opening an advanced industrial information base in the United States. Among programs under "Promotion of international exchange including support for foreign researchers," trainees from China and South Korea were prominent (15 programs out of a total of 27 programs that replied included foreign trainees). Others included [supporting] international conferences, international symposia and joint research (Tables 5-4-1 and 5-4-2 for the description of these projects).

The total budget under these categories amounted to approximately ¥15.5 billion, or 4.4 percent of the total (regular) S&T-related budget.

Table 5-4-1. List of Projects for Improving Infrastructures for International Exchange (FY1990).

Local government	Project title	Department in charge	Project description
Hokkaido	Request to establish internat. training center	General Affairs Department	Requested the establishment [of the center] in Hokkaido to the Japan International Cooperation Agency (JICA), Foreign Ministry
Akita Prefecture	Construct Training and Technology Center for Metallurgy and Mining	Commerce, Industry and Labor Department	As a comprehensive research, training and exchange facility, the Training and Technology Center for Metallurgy and Mining has been built. The building sizes are 1,244 m ² for the main building, 1,855 m ² for the lodging facility, 353 m ² for the guest house, and 259 m ² for the restaurant.
Fukushima Prefecture	Improve prefectural university	General Affairs Department	
Kanagawa Prefecture	Promote the plan for the Shonan International Village (tentative name)	Planning Department	To build the "Shonan International Village (tentative name)," which will serve as an international exchange infrastructure under green shades and contribute to the world and to the development of regional society, surveys were conducted on [the feasibility of] establishing the Research and Education Foundation (tentative name), on the formation of a community, actions were taken to invite research and training facilities, to open the Shonan International Village, and investments were made to the Shonan International Village Association, Inc.
Ishikawa Prefecture	Operate Ishikawa High-Tech Satellite Center --United States	Commerce, Industry & Labor Dept. (Industrial Testing Laboratory)	Opened the Ishikawa High-Tech Satellite Center-U.S.A. as an information base in the United States, where advanced technologies are concentrated. The prefecture will promote R&D on advanced technologies based on the information obtained through this center to advance industrial technologies in the prefecture.
Hyogo Prefecture	Expand, improve R&D infrastructures (build Advanced Technology R&D Center (tentative name))	Commerce and Industry Department	
Tottori Prefecture	Fund New Industry Creation Center, Inc.	Commerce, Industry and Labor Department	Established New Industry Creation Center, Inc. (in April 1990). (Buildings will be constructed in FY1991)
Hiroshima Prefecture	Promote the concept of an international manpower training base	General Affairs Department	Functions will be expanded and strengthened to serve as a base for manpower training for and technology cooperation with developing countries mainly in Asia. For this purpose, base facilities will be installed and details of projects will be examined. (Operating expenses for the Concept Adoption Committee; survey concerning the adoption of the concept)
Saga Prefecture	Hold Arita International Fine Ceramics Symposium	Commerce, Industry and Labor Department	Regularly hold International Fine Ceramics Symposium (since 1984; examining the possibility of constructing an international conference hall inside Arita Ceramics Testing Laboratory)
Sendai [city]	Construct Sendai International Center	Internat. Exchange Division, Planning Department	To establish Sendai as an international academic and convention city, the Sendai International Center was built to serve as a base for promoting internationalization

Table 5-4-2. List of International Exchange Projects, Including Support for Foreigners (FY1990).

Local government	Project title	Department in charge	Project description
Hokkaido	Medical technology exchange project with Heilongjiang Province, China	Public Health and Environmental Department	Technicians sent (technicians were sent to and received from China since FY1991)
Miyagi Prefecture	Promote overseas technology exchange	Commerce, Industry and Labor Department	Receive technical trainees from Jilin Province, China, a friendship province
	Receive agricultural trainees from Jilin Province, China	Agriculture Department	Received 3 agricultural trainees from Jilin Province according to an exchange program between Miyagi Prefecture and Jilin Province
Gunma Prefecture	Receive trainee doctors from China	Medical and Environmental Department	To improve clinical techniques of hospital doctors in Shaanxi [China] Province and to contribute to the friendship between Japan and China, Gunma received trainee doctors into its medical facilities since 1983. (In FY1990), 4 doctors came for 3 months
Saitama Prefecture	Agricultural exchange project between Saitama Prefecture and Shanxi Province [China]	Agriculture and Forestry Department	Dispatch agricultural experts to between Saitama Prefecture and Shanxi Province. Received 6 experts and sent 2 experts.
Toyama Prefecture	Scholarship for international exchange	General Affairs Dept.	
	Research fund for [improving] international understanding	General Affairs Dept.	(Office expenses in addition)
	Subsidy for national health insurance premium	General Affairs Dept.	
Ishikawa Prefecture	Receive foreign technical trainees to Ishikawa Prefecture	Community and Public Welfare Bureau, Agriculture and Fishery Department	(Supervised by the Community and Public Welfare Bureau) Received technical trainees from Korea (about 7 months), 3 trainees to Agricultural General Testing Laboratory, 3 trainees to Livestock Testing Laboratory. [Supervised by Agriculture and Fishery Dept] Received 1 technical trainee from Korea (for about 1 month) to Livestock Testing Lab
	Creative intelligence group (guest researcher) system	Commerce, Industry and Labor Department	Receive technical trainees from China (for about 7-9 months). Received 2 trainees to Agricultural Testing Laboratory. Researchers (guest researchers) will be invited from domestic, foreign universities, & businesses to promote advancement of local industries and transformation of business structures
Nagano Prefecture	Prefectural program to receive overseas trainees	Public Welfare and Environment Department	Train manpower to contribute to development of national economic societies [of visitors] and to improvement of international friendship by receiving and providing technical training to trainees from developing countries. Also, improve mutual understanding through contact with local residents

[Continued]

[Continuation of Table 5-4-2]

Local government	Project title	Department in charge	Project description
Gifu Prefecture	Provide guidance to forestry trainees from China	Forestry Department	Provide training to Chinese technical trainees at the Forestry Center
Aichi Prefecture	Provide subsidy to hold international conferences on advanced technologies	Commerce and Industry Department	Grants to hold international conferences on advanced technologies hosted by academic associations
	Expenses to hold international symposia on advanced technologies	Commerce and Industry Department	Hold international symposia on advanced technologies
Osaka Prefecture	Invite foreign researchers	Commerce and Industry Department	Invite senior foreign researchers to Industrial Technology Comprehensive Research Institute to vitalize research through guidance and advice, to improve support for businesses. 1 Chinese researcher invited in FY1990
Tottori Prefecture	Receive agricultural researchers from Hebei Province, China	Agriculture, Forestry and Fishery Department	Receive researchers from Hebei Province, China who wish to learn agricultural technology of Tottori, and train in testing laboratories and agricultural universities
Shimane Prefecture	Receive foreign technical trainees	General Affairs Department	Receive mid-level technicians from developing countries and train them at prefectural research facilities
Yamaguchi Prefecture	[Hold] international symposia on ultra-high temperature materials	Commerce, Industry and Labor Dept.	Invite domestic and foreign senior researchers, hold symposia on ultrahigh temperature materials, promote exchange of researchers
Fukuoka Prefecture	Receive foreign technical trainees	International Exchange Division	Receive trainees from developing countries to contribute to the economic development and prosperity of their countries by learning necessary technologies and contacting local residents. Project will also contribute to exchange between Fukuoka and developing countries in various areas. Total of 15 trainees (1--agriculture, 3--fishery, 3--livestock breeding, 5--manufacturing industries, and 3--other categories) received
Kumamoto Prefecture	Promote agricultural technology exchange between Japan and China	Agriculture Department	Receive trainees to prefectural agricultural universities and research facilities
	International Public Health Clinical Exchange Center	Public Health Department	Carry out training projects for public health clinical specialists from developing countries to contribute mainly to improving public health clinical treatment
Miyazaki Prefecture	Promote international joint research on SPG [cirrus porous glass]	Commerce, Industry and Labor Dept.	Conduct joint research with Alabama State University to promote wide applications of SPG
Kagoshima Prefecture	Promote agricultural technology exchange with China	Agriculture Department	Mutually dispatch exchange delegates in alternate years and exchange breed and information

[continued]

[Continuation of Table 5-4-2]

Local government	Project title	Department in charge	Project description
Osaka [city]	Academic exchange between Osaka and Shanghai	City university office	Provide expenses for visitors [from Shanghai]
	Academic exchange with St. Petersburg National University	City university office	Support for living expenses, including lodging
	Overseas technology cooperation	Economics Bureau	Receive [visitors] through JICA
	Technology cooperation with China	Economics Bureau	Technology exchange with Shanghai, a friendship city

6. Establishment of Organizations for S&T Promotion and Their Funding (Nonadministrative)

In this chapter we describe the status of organizations established for S&T promotion and funding of local public foundations based on our survey of prefectures and designated cities (45 prefectures and seven designated cities replied) conducted in January 1992.¹³

For this study, we surveyed foundations, research institutions owned by the third sector, and R&D support facilities (funded by prefectures or designated cities). The summary of replies from 45 prefectures and seven designated cities is as follows:

61 research institutes, with a total endowment of ¥91.9 billion;

69 R&D support facilities, with a total endowment of ¥115 billion; and

A total of 121 institutions, with a total endowment of ¥194.7 billion (including 9 duplications).

(These institutions are listed in Tables 6-3 and 6-4.)

Most of these 121 institutions were established since 1977 (mostly in the 1980s) (Figure 6-1).

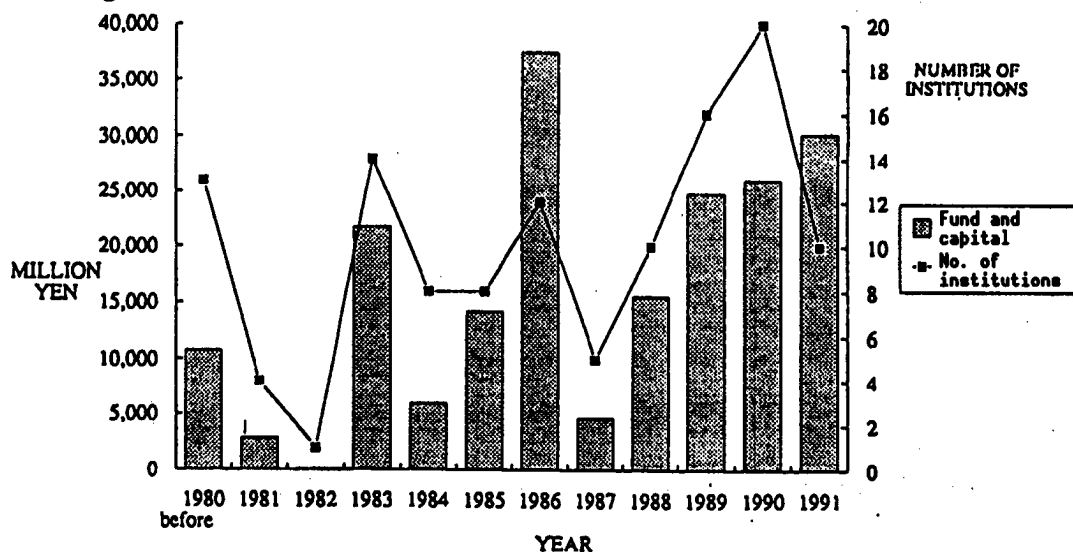


Figure 6-1. Establishment of Research and R&D Support Institutions
(Invested or funded by local governments)

¹³ Local governments that did not reply to this survey are: Tokyo Metropolis and Nagasaki Prefecture, and 4 designated cities—Sapporo, Yokohama, Nagoya and Fukuoka.

Table 6-1. Research Institutions and R&D Support Institutions Invested or Funded by Local Governments

(1) Research institutions

(¥1,000)

Year established	Foundations, etc.				Corporations				Total			
	No. of institutions	Total funds	Local government funds	Share	No. of institutions	Sum of capital	Local government invested	Share	No. of institutions	Sum of funds & capital	Local gov. funded & invested	Share
Before 1980	8	2,237,601	472,000	21.09%					8	2,237,601	472,000	21.09%
1981	3	870,000	15,000	1.72%					3	870,000	15,000	1.72%
1982	1	10,000	10,000	100.00%					1	10,000	10,000	100.00%
1983	3	1,440,570	845,390	58.68%					3	1,440,570	845,390	58.68%
1984	2	410,032	252,000	61.46%					2	410,032	252,000	61.46%
1985	4	9,054,949	2,687,000	29.67%					4	9,054,949	2,687,000	29.67%
1986	3	21,378,280	89,450	0.42%	1	10,000	10,000	100.00%	4	21,378,280	99,450	0.47%
1987	3	3,151,900	1,315,900	41.07%	1	1,030,000	1,000,000	97.09%	4	4,181,900	2,325,900	55.62%
1988	3	4,400,100	100,000	2.27%	2	1,747,430	308,500	17.65%	5	6,147,530	408,500	6.64%
1989	4	11,507,500	4,600,000	39.97%	3	7,398,050	620,000	8.38%	7	18,905,550	5,220,000	27.61%
1990	10	15,909,650	2,960,000	18.61%	6	5,983,000	700,000	11.70%	16	21,892,650	3,660,000	16.72%
1991	2	5,012,600	3,755,000	74.91%	1	380,000	5,000	1.32%	3	5,392,600	3,760,000	69.73%
Total	47	75,273,183	17,111,740	22.70%	14	16,548,480	2,643,500	15.97%	61	91,821,662	19,755,240	21.49%

(2) R&D support institutions

(¥1,000)

Year established	Foundations, etc.				Corporations				Total			
	No. of institutions	Total funds	Local government funds	Share	No. of institutions	Sum of capital	Local government invested	Share	No. of institutions	Sum of funds & capital	Local gov. funded & invested	Share
Before 1980	5	8,560,380	1,161,000	13.56%					5	8,560,380	1,161,000	13.56%
1981	1	2,000,000	1,000,000	50.00%					1	2,000,000	1,000,000	50.00%
1982												
1983	13	21,764,958	11,251,769	51.70%					13	21,764,958	11,251,769	51.70%
1984	6	5,968,070	3,729,425	62.49%					6	5,968,070	3,729,425	62.49%
1985	5	5,421,100	3,259,588	60.13%					5	5,421,100	3,259,588	60.13%
1986	7	11,667,535	6,570,000	56.31%	1	4,500,000	500,050	11.11%	8	16,167,535	7,070,050	43.73%
1987	2	1,715,900	1,265,900	73.77%					2	1,715,900	1,265,900	73.77%
1988	2	1,593,430	630,000	39.54%	4	8,123,000	1,898,350	23.37%	6	9,716,430	2,528,350	26.02%
1989	10	9,922,300	6,880,214	69.34%					10	9,922,300	6,880,214	69.34%
1990	4	7,365,834	2,525,000	34.28%	1	1,473,000	200,000	13.58%	5	8,838,834	2,725,000	30.83%
1991	6	17,412,600	12,255,000	70.38%	2	7,500,000	820,000	10.93%	8	24,912,600	14,075,000	56.50%
Total	61	93,392,007	51,527,896	55.17%	8	21,596,000	3,418,400	15.83%	69	114,988,007	54,946,296	47.78%

(3) Research institutions and R&D support institutions

(¥1,000)

Year established	Foundations, etc.				Corporations				Total			
	No. of institutions	Total funds	Local government funds	Share	No. of institutions	Sum of capital	Local government invested	Share	No. of institutions	Sum of funds & capital	Local gov. funded & invested	Share
Before 1980	13	10,797,981	1,633,000	15.12%					13	10,797,981	1,633,000	15.12%
1981	4	2,870,000	1,015,000	35.37%					4	2,870,000	1,015,000	35.37%
1982	1	10,000	10,000	100.00%					1	10,000	10,000	100.00%
1983	14	21,774,958	11,256,769	51.70%					14	21,774,958	11,256,769	51.70%
1984	8	5,972,070	3,731,425	62.48%					8	5,972,070	3,731,425	62.48%
1985	8	14,296,049	5,896,588	41.25%					8	14,296,049	5,896,588	41.25%
1986	10	33,035,815	6,659,450	20.16%	2	4,510,000	510,050	11.31%	12	37,545,815	7,169,500	19.10%
1987	4	3,651,900	1,825,900	50.00%	1	1,030,000	1,000,000	97.09%	5	4,681,900	2,825,900	60.36%
1988	4	5,743,050	680,000	11.84%	6	9,870,430	2,206,850	22.36%	10	15,613,480	2,886,850	18.49%
1989	13	17,429,700	7,980,214	45.79%	3	7,398,050	620,000	8.38%	16	24,827,750	8,600,214	34.64%
1990	13	18,608,484	3,985,000	21.41%	7	7,456,000	900,000	12.07%	20	26,064,484	4,885,000	18.74%
1991	7	22,412,600	17,005,000	75.87%	3	7,880,000	825,000	10.47%	10	30,292,600	17,830,000	58.86%
Total	99	134,189,987	44,673,346	33.29%	22	30,264,480	5,236,900	17.30%	121	164,454,467	49,910,246	30.35%

The number of these newly established research facilities peaked in 1983 and 1986, reflecting the implementation of new national policies on technopolis (1983) and research core (1986).

These institutions include 99 foundations (including corporations) and 22 incorporated stock companies. The latter comprises 18.2 percent of the total. Incorporated companies were established on 1986 or afterwards, accounting for 30.1 percent of such institutions established during that period, which includes 51 foundations. (See Table 6-1.)

The average endowment for a foundation is about ¥1.58 billion, while that for a company is about ¥1.73 billion, not very different from the former. Local governments' share of the capital investment is 39.4 percent in foundations and 15.9 percent in companies, indicating a large difference.

Local governments paid ¥67.7 billion (or 34.8 percent of the total; this amount is a cumulative one and not the investment in FY1990) out of a total endowment of about ¥194.7 billion. Additional payments are made by local governments in the form of subsidies and consignments to these institutions. The total payments to these institutions in FY1990, including annual payments into endowments, reached about ¥14.3 billion, or 4.1 percent of the S&T-related budget (regular budget).

Also, we included the establishment of funds to promote S&T in our survey. We received replies from six local governments on nine endowments, or ¥6.5 billion in total amount. We list titles of the endowments and their purposes in Table 6-2.

Table 6-2. List of Endowments for S&T Promotion. (Amount in ¥1,000)

Endowment title	Local government	Department in charge	Endowment amount	Remarks
Industrial Technology Promotion Fund	Ibaraki Prefecture	Commerce, Industry and Labor Department	1,500,000	Consign joint research by industry, academia and government; assist development of new products and technologies; assist manpower training; assist technology exchange and dissemination
Tsukuba Fund to Foster R&D-Type Enterprises	Ibaraki Prefecture	Commerce, Industry and Labor Department	350,000	[Support] R&D projects; manpower training projects; information survey projects
Liability Guarantee Fund	Toyama Prefecture	Commerce, Industry and Labor Department	250,000	Guarantee loans to medium and small businesses in technopolis areas to be used as R&D funds
R&D Fund	Toyama Prefecture	Commerce, Industry and Labor Department	365,100	Assist R&D for new technologies by medium and small businesses in the prefecture (no interests, pay when successful)
Technology Promotion Fund	Toyama Prefecture	Commerce, Industry and Labor Department	1,065,250	[Support] training and guidance, technology exchange, survey studies and information service
Shiga Prefecture Fund to Promote Industrial Technologies	Shiga Prefecture	Commerce, Industry and Labor Department	735,010	Provide grants for projects to promote industrial technologies and to improve training equipment; open a Technology Consulting Corner
Regional S&T Promotion Fund Incorporated as the Yamaguchi Prefecture Industrial Technology Development Organization	Yamaguchi Prefecture	Commerce, Industry and Labor Department	1,000,000	(Accumulate during FY1991-93); (basic R&D projects) conduct R&D on basic research areas, which is difficult to be carried out by private enterprises alone, through consignments to research groups that consist of industrial, academic and government partners in and out of the prefecture. [Translator's note: This entry is incomplete, probably a typesetting error.]
Fund to Promote Osaka City University	Osaka City	City University Office	1,000,000	Assist special research projects; assist attendance of international meetings by graduate students; cover travel expenses of professors; provide scholarships and welfare assistance to students
Kitakyushu Fund to Promote Technology Development by Medium and Small Businesses	Kitakyushu city	Industry Division, Economics Bureau	268,163	Grants to promote technology development by medium and small businesses in Kitakyushu; provide grants to medium and small businessmen or firms who conduct R&D on new technologies and products
Total			6,533,523	

Table 6-3. Research institutions invested or funded by local governments. (Amount in ¥1,000)

Institution	Date estab- lished (y/m/d)	Prefecture	Endowment	Prefectural contribution to endowment	Total capital	Prefectural contribution to capital	Department in charge	Amount paid in FY1990
Eniwa Research Business Park, Inc.	88/04/00	Hokkaido			1,508,430	300,000	Commerce, Industry, Labor and Tourism	0
Muroran Techno Center	86/12/01	Hokkaido	74,780	20,000			Commerce, Industry, Labor and Tourism	49,629
Hokkaido Green Bioresearch Institute Inc.	87/04/00	Hokkaido			1,030,000	1,000,000	Agriculture	0
Hachinohe Intelligent Plaza, Inc.	89/05/00	Aomori			900,000	100,000	Commerce, Indus- try, and Labor	
Saccharic Chain Engineering Research Institute, Inc.	91/02/00	Aomori			380,000	5,000	Planning	0
Fish Farming Technology Research Institute for Cold Water, Superior Fish, Inc.	89/03/01	Iwate			1,000,000	30,000	Forestry and Fishery	5,000
Intelligent Cosmos Research Organization, Inc.	89/02/10	Miyagi			5,498,050	490,000	Planning	170,000
Akita Prefecture Analytical Chemistry Center	72/06/01	Akita	5,000				Public Welfare and Environmental	0
Akita Prefecture Resource Technology Development Foundation	90/11/28	Akita	427,000	200,000			Commerce, Indus- try, and Labor	203,419
Fukushima Prefectural Foundation for the Promotion of Industrial Technologies	84/10/00	Fukushima	406,032	250,000			Commerce, Indus- try, and Labor	0
Tochigi Comprehensive Research Foundation		Tochigi	300,000	60,000			Planning and Co- ordination Div.	
Association for the Promotion of Comprehensive Research for Earthquake Detection	81/01/22	Saitama	290,000	5,000			Environmental	0
Association for the Promotion of Comprehensive Research for Earthquake Detection	81/01/22	Chiba	290,000	5,000			General Affairs	0

Kazusa DNA Research Institute	91/03/00	Chiba	5,000,000	3,750,000				Planning	752,500
Kanagawa S&T Academy	89/07/00	Kanagawa	4,000,000	3,500,000				Planning	1,364,086
Kihara Memorial Yokohama Life Science Promotion Foundation	85/03/00	Kanagawa	180,000	50,000					
Laser Application Engineering Center, Inc.	90/03/20	Miigata			1,050,000	100,000		Commerce, Industry, and Labor	100,000
Fukui Prefecture Industry Promotion Foundation	87/03/12	Fukui	1,215,900	765,900				Commerce, Industry, and Labor	0
Association for the Promotion of Comprehensive Research for Earthquake Detection	81/01/22	Nagano	290,000	5,000				Public Welfare and Environmental	0
Nagano Prefecture Technology Center	72/04/10	Nagano	5,000	5,000				Public Works	0
Nagano Prefecture Pure Breed Center, Inc.	87/04/30	Nagano	900,000	360,000				Agriculture	56,600
Gifu Prefecture Public Hygiene Inspection Center	73/02/00	Gifu	30,001	10,000				Medical and Environmental	0
Ultra-High Temperature Materials Research Center, Inc.	90/03/00	Gifu			66,000			Commerce, Industry, and Labor	0
Gifu-Tsukuba Information Center, Inc.	90/04/00	Gifu						Commerce, Industry, and Labor	235,533
Japan Fine Ceramics Center	85/05/07	Aichi	3,467,152	500,000				Commerce and Industry	15,000
International Environmental Technology Transfer Research Center	90/03/00	Mie	4,667,000	1,500,000				Governor's Secretariat	750,000
Mie Prefecture Industrial Technology Promotion Foundation	90/05/00	Mie	822,650	400,000				Commerce, Industry, and Labor	877,232
Shiga Prefecture Park and Green Area Center	88/11/01	Shiga	49,600	30,000				Public Works	20,897
Shiga Prefecture Construction Technology Center	83/08/00	Shiga	10,000	5,000				Public Works	5,000
Kyoto Advanced Technology Research Institute	88/08/09	Kyoto	250,500	50,000				Commerce and Industry	

Ion Engineering Research Institute Corporation	88/11/22	Osaka				239,000	8,500	Commerce and Industry	0
Osaka Cancer Prevention Diagnostic Center	86/10/01	Osaka				10,000	10,000	Environment and Public Health	530,000
Research Institute of Innovative Technology of the Earth, Inc.	90/07/00	Osaka	8,000,000	200,000				Environment and Public Health	74,223
International Telecommunication Basic Technology Research Institute, Inc.	86/03/22	Nara	20,880,000	14,450				Planning	0
Ion Engineering Research Institute Corporation	88/11/21	Nara	4,100,000	20,000				Commerce, Industry and Labor	0
Keihanna	89/08/02	Nara	6,000,000	50,000				Planning	25,000
Okayama Techno Promotion Foundation	91/03/18	Okayama	12,600	5,000				Commerce, Industry and Labor	5,000
New Industry Creation Center, Inc.	90/04/00	Tottori				1,335,000	200,000	Commerce, Industry and Labor	200,000
Shimane Incurable Disease Research Institute	76/05/00	Shimane	302,000	301,000				Environment and Public Health	45,880
Okayama Prefecture New Technology Promotion Foundation	83/12/00	Okayama	1,135,550	835,390				Commerce and Industry	162,500
Okayama Ceramics Technology Promotion Foundation	90/03/00	Okayama	400,000	150,000				Commerce and Industry	166,254
Okayama Prefecture Environmental Protection Corporation	74/10/00	Okayama	1,626,500	10,000				Environment and Public Health	0
Okayama Prefecture Agricultural Development Research Institute, Inc.	86/12/00	Okayama	378,000	50,000				Agriculture and Forestry	0
Ultra-High Temperature Materials Research Center, Inc.	90/03/00	Yamaguchi				2,250,000	200,000	Commerce, Industry and Labor	0
Tokushima Prefecture Regional Industrial Technology Development Research Foundation	85/08/15	Tokushima	1,247,810	335,000				Commerce, Industry and Labor	0
Ehime Technopolis Foundation's High Innovation Research Institute	89/04/01	Ehime	1,250,000	950,000				Commerce, Industry and Labor	4,000

International East Asia Research Center	90/01/01	Fukuoka	570,000	100,000				Planning and Promotion	
International Public Health Clinical Exchange Center	90/02/00	Kumamoto	300,000	50,000				Medical	0
Electronics Application Machine Technology Research Institute	85/04/00	Kumamoto	4,159,987	1,802,000				Commerce, Industry, Tourism and Labor	70,000
Kumamoto Prefecture Construction Technology Center	94/03/00	Kumamoto	4,000	2,000				Public Works	0
Oita Prefecture Advanced Technology Development Research Institute	83/12/00	Oita	295,020	5,000				Commerce, Industry, Labor and Tourism	21,367
Kagoshima Prefecture Fine Ceramic Product Development Research Institute	84/10/00	Kagoshima						Commerce, Industry and Labor	6,491
Tropical Techno Center, Inc.	90/10/00	Okinawa			1,282,000	200,000		Commerce, Industry and Labor	223,000
Okinawa Agriculture, Forestry and Fishery Technology Development Association	86/04/00	Okinawa	35,500	5,000				Agriculture, Forestry and Fishery	7,392
Kyoto Advanced Technology Research Institute	89/10/20	Kyoto City	257,500	100,000				Economics Bureau	318,817
Kyoto Public Health Inspection and Research Center	79/06/00	Kyoto City	16,500	4,000				Medical Bureau	0
Osaka Bioscience Research Institute	87/01/28	Osaka City	1,036,000	200,000				Environment and Public Health Bureau	700,000
Kansai Information Center	70/06/30	Osaka City	250,600	50,000				Planning Bureau	0
Hiroshima Fishery Promotion Association	82/04/01	Hiroshima City	10,000	10,000				Economics Bureau	183,057
International East Asia Research Center	90/01/00	Kitakyushu City	423,000	300,000				Planning Bureau	348,800
Kitakyushu Municipal Association	77/11/01	Kitakyushu City	2,000	2,000				Planning Bureau	78,840
		Total	75,373,182	17,111,740	16,548,480	2,643,500			7,763,517

Table 6-4. Research and Development Facilities Funded by Local Governments. (Amount in ¥1,000)

Facility name	Date established (y/m/d)	Prefecture	Endowment	Prefectural contribution to endowment	Total capital	Prefectural contribution to capital	Department in charge	Amount paid in FY1990
Technopolis Hakodate Technology Promotion Association	84/07/00	Hokkaido	1,141,110	750,000			Commerce, Industry, Labor and Tourism	146,100
Doo [Central Hokkaido] Technopolis Development Foundation	88/06/00	Hokkaido	1,543,430	600,000			Commerce, Industry, Labor and Tourism	244,844
Aomori Technopolis Development Foundation	84/10/00	Aomori	1,106,000	440,000			Commerce, Industry and Labor	4,000
Hachinohe Regional Advanced Technology Promotion Center	85/10/00	Aomori	531,000	145,000			Commerce, Industry and Labor	103,750
Iwate Prefecture Advanced Technology Promotion Association	86/09/01	Iwate	1,478,135	845,000			Commerce, Industry and Labor	8,146
Itochu Industrial Technology Development Association	66/10/01	Miyagi	483,880	340,000			Commerce, Industry and Labor	72,500
Miyagi Prefecture Advanced Technology Promotion Foundation	86/02/01	Miyagi	1,452,100	1,050,000			Commerce, Industry and Labor	84,700
Suisei Agricultural Science Promotion Association	89/03/01	Miyagi	35,000	20,000			Agriculture	0
Techno Plaza Miyagi	88/00/00	Miyagi			3,555,000	1,000,000		250,000
Akita Technopolis Development Foundation	84/02/01	Akita	1,614,928	889,425			Commerce, Industry and Labor	83,696
Yamagata Technopolis Foundation	85/04/22	Yamagata	2,900,000	1,960,588			Commerce, Industry and Labor Development	4,236
Yamagata University Industrial Research Institute	83/12/00	Yamagata	75,510	9,500			Commerce, Industry and Labor Development	5,500
Fukushima Prefecture Industrial Technology Promotion Foundation	84/10/00	Fukushima	406,032	250,000			Commerce, Industry and Labor	

Ibaraki Prefecture S&T Promotion Foundation	89/10/30	Ibaraki	246,482	233,482				Commerce, Industry and Labor	72,000
Tsukuba Research Support Center	88/00/00	Ibaraki			2,800,000	513,350			
Tochigi Prefecture Industrial Technology Promotion Association	83/12/00	Tochigi	1,479,860	700,000				Commerce, Industry, Labor and tourism	14,056
Chiba Prefecture Industrial Technology Promotion Center	86/04/00	Chiba	903,000	500,000				Commerce, Industry and Labor	139,764
Kanagawa S&T Academy	89/07/00	Kanagawa	4,000,000	3,500,000				Planning	236,648
Kanagawa Advanced Technology Support Foundation	89/08/28	Kanagawa	1,200,000	1,000,000				Commerce and Industry	220,655
KSB [expansion unknown]	86/12/19	Kanagawa			4,500,000	500,050			0
Kihara Memorial Yokohama Life Science Promotion Foundation	85/03/00	Kanagawa	180,000	50,000				Planning	
Shinagawa Technopolis Development Foundation	83/03/00	Niigata	2,275,000	1,040,000				Commerce, Industry and Labor	19,000
Toyama Technology Development Foundation	83/12/00	Toyama	2,987,850	1,362,000				Commerce, Industry and Labor	456,258
Toyama Prefecture Advanced Education Promotion Foundation	90/10/29	Toyama	10,000	10,000				General Affairs	10,000
Toyama Prefecture Industrial Creation Center	88/00/00	Toyama	50,000	30,000					30,000
Ishikawa Prefecture Industrial Promotion Fund Association	60/05/00	Ishikawa	2,853,000					Commerce and Industry Division	600,000
Fukui Prefecture Industry Promotion Foundation	87/03/12	Fukui	1,215,900	765,900				Commerce, Industry and Labor	
Yamanashi 21st-Century Industry Development Foundation	86/11/00	Yamanashi	2,479,000	1,502,000				Commerce, Industry and Labor	
Asama Technopolis Development Foundation	85/10/00	Nagano	1,800,000	1,100,000				Commerce and Industry	4,000
Nagano Prefecture Techno Highland Development Foundation	86/10/00	Nagano	3,900,000	1,600,000				Commerce and Industry	

Shizuoka Prefecture S&T Promotion Foundation	91/06/01	Shizuoka	6,600,000	6,600,000			Commerce, Industry and Labor	0
Shizuoka Prefecture Academic Education Promotion Foundation	87/03/31	Shizuoka	500,000	500,000			Planning and Coordination	
Shizuoka Prefecture Agriculture Promotion Fund Association	81/08/25	Shizuoka	2,000,000	1,000,000			Agriculture	100,000
Aichi Prefecture Agriculture Promotion Fund	91/10/16	Aichi	4,000,000	3,000,000			Agriculture and Fishery	
Science Create	90/00/00	Aichi			1,473,000	200,000		0
International Environmental Technology Transfer Research Center	90/03/00	Mie	4,667,000	1,500,000			Governor's Secretariat	1,503,070
Shiga Prefecture Industrial Technology Promotion Association	85/03/00	Shiga	10,100	4,000			Commerce, Industry and Labor	30,129
Kyoto Industrial Technology Promotion Foundation	91/12/19	Kyoto	2,000,000	1,600,000			Commerce and Industry	
Senri Life Science Promotion Foundation	90/07/31	Osaka	2,500,000	1,000,000			Planning and Coordination	1,000,000
Senri Life Science Center	88/00/00	Osaka			602,000	125,000		
Hyogo Prefecture S&T Promotion Foundation	76/04/00	Hyogo	200,000	200,000			Commerce and Industry	
EHRIC [phonetic translation]	91/00/00	Hyogo			2,500,000	320,000		20,000
Nara Advanced S&T Graduate School and University Support Foundation	91/07/18	Nara	4,000,000	1,250,000			Planning	
Wakayama Techno Promotion Foundation	91/03/18	Wakayama	12,600	5,000			Commerce, Industry and Labor	0
Tottori Prefecture Industrial Technology Promotion Association	86/04/00	Tottori	205,300	123,000			Commerce, Industry and Labor	11,820
Shimane Technology Promotion Association	89/05/00	Shimane	377,252	126,732			Commerce, Industry and Labor	81,994

Okayama Prefecture New Technology Promotion Foundation	83/12/00	Okayama	1,135,550	835,390				Commerce and Industry	
Hiroshima Prefecture Industrial Technology Promotion Foundation	83/11/24	Hiroshima	1,748,000	1,020,000				Commerce, Industry and Labor	15,512
Hiroshima Prefecture Agricultural Gene Bank	89/12/18	Hiroshima	304,466					Agriculture	125,208
Yamaguchi Prefecture Industrial Technology Development Foundation	83/10/00	Yamaguchi	3,067,712	2,062,520				Commerce, Industry and Labor	130,955
Kagawa Prefecture Industrial Technology Development Foundation	84/10/01	Kagawa	1,000,000	700,000				Economics and Labor	69,458
Ehime Prefecture Public Health and Clinics Foundation	75/02/15	Ehime	5,000,000	601,000				Public Health and Environmental	0
Ehime Prefecture Technology Development Promotion Foundation	84/07/01	Ehime	700,000	700,000				Commerce, Industry and Labor	0
Ehime Technopolis Foundation	86/11/01	Ehime	1,250,000	950,000				Commerce, Industry and Labor	4,000
Toyo Industrial Creation Center	90/09/13	Ehime	188,834	15,000				Commerce, Industry and Labor	39,273
Fukuoka S&T Promotion Foundation	89/11/00	Fukuoka	1,500,000	1,500,000				Commerce and Industry	500,000
Kurume Research Park	88/00/00	Fukuoka			1,166,000	260,000			
Fukuoka Soft Research Park	91/00/00	Fukuoka			5,000,000	500,000			0
Kurume-Tosu Regional Technology Promotion Center	83/11/00	Saga	593,200	80,000				Planning Bureau	30,000
Saga Industrial Technology Information Center	89/03/00	Saga	762,000	200,000				Commerce, Industry and Labor	
Kumamoto Technopolis Foundation	83/11/00	Kumamoto	4,159,987	1,802,000				Commerce, Industry, Labor and Tourism	70,000
Kumamoto Technopolis Technology Development Fund	83/11/00	Kumamoto	736,104	269,000				Commerce, Industry, Labor and Tourism	3,276

Oita Prefecture Regional Technology Promotion Foundation	83/12/00	Oita	814,015	505,015			Commerce, Industry, Labor and Tourism	3,000
Oita Prefecture Advanced Technology Development Research Institute	83/12/00	Oita	295,020	5,000			Commerce, Industry, Labor and Tourism	21,367
Kagoshima Prefecture Industrial Technology Promotion Association	83/06/01	Kagoshima	2,397,150	1,561,344			Commerce, Industry and Labor	71,665
Kanagawa Advanced Technology Support Foundation	89/08/28	Kawasaki City	1,200,000	200,000			Economics Bureau	200,000
Kyoto Advanced Technology Research Institute	89/10/20	Kyoto City	257,000	100,000			Economics Bureau	265,000
Osaka City University Support Association	65/01/00	Osaka City	23,500	20,000			City University Office	0
Kitakyushu Industrial Technology Promotion Fund	91/03/29	Kitakyushu City	800,000	800,000			Economics Bureau	410,000
		Total	93,392,007	51,527,896				7,515,580

7. Formation of Diverse Research Consortia

We first explain in detail the objective and method of our survey on the formation of diverse research consortia, and then report the current status of these consortia.

7.1 Survey Objective

In recent years, the central government has promoted research exchanges among different organizations unincumbered by existing systems to carry out creative R&D more efficiently and effectively. Regional public organizations are also following this trend.

Many joint research projects have been carried out among private firms. The central government has also promoted and supported such activities to encourage them further by introducing systems tailored to the needs of each era after the Mining Industrial Technology Research Cooperative was established in 1961.

The objective of this survey is to identify the current status of research consortia that have been formed through these joint research projects.

7.2 Survey Method

Our survey was conducted on the current status of:

- (1) Joint research projects centered around national research institutions;
- (2) Joint research projects centered around national universities;
- (3) Joint research projects centered around regional research institutions; and
- (4) Joint research projects among private firms.

The survey results are presented in Table 7-3-1 as a matrix, and the sum under each category was recorded as the number of consortia engaged in various research activities.

The survey methods actually used for (1)-(4) above are explained below.

(1) Joint Research Projects Centered Around National Research Institutions

There are a total of 93 national "testing and research institutions" defined in the Law to Promote Research Exchange. However, not all of these institutions made public their data on joint research topics, partners, duration and content of joint projects.

Joint research projects are carried out after a joint research contract is signed by all partners. When the number of joint projects exceeds a certain

Table 7-3-1. Number of Research Consortia

(Private corporations)

	Universities	National research institutions	Local public entities	Private corporations
Universities	Unknown			
National research institutions	108	53		
Local public entities	28	16	433	
Private corporations	823	554	471	(300)

Universities	National research institutions	Local public entities	0
--------------	--------------------------------	-----------------------	---

Universities	National research institutions	Private corporations	4
--------------	--------------------------------	----------------------	---

Universities	Local public entities	Private corporations	1
--------------	-----------------------	----------------------	---

National research institutions	Local public entities	Private corporations	12
--------------------------------	-----------------------	----------------------	----

Universities	National research institutions	Local public entities	Private corporations	5
--------------	--------------------------------	-----------------------	----------------------	---

limit, usually operating manuals are prepared to help smooth execution of such projects. We focused our attention to the central government agencies that enforce rules on joint research and surveyed the type of data that these agencies edit, publish and collect.

According to "Research Exchange Handbook" (edited by STA), there are seven government agencies that maintain rules on joint research—Hokkaido Development Agency, STA, the Ministry of Agriculture, Forestry and Fisheries, MITI, the Ministry of Transport, the Ministry of Posts and Telecommunications and the Ministry of Construction.

Actual survey data were obtained from the following sources:

Hokkaido Development Agency: Planning Office, Hokkaido Development Agency

STA: R&D Cooperation Division, S&T Promotion Bureau, STA

Ministry of Agriculture, Forestry and Fisheries: Coordination Section, Agriculture, Forestry and Fisheries Research Council

MITI: FY1991 Research Plan for Testing and Research Institutions (edited by the Agency of Industrial S&T [AIST])

Ministry of Transport:

FY1990 Research Plan (Meteorological Research Institute)

FY1990 Annual Report of the Port and Harbor Research Institute (Port and Harbor Research Institute)

FY1990 Annual Report of the Ship Research Institute (Ship Research Institute)

Oral reports from the Electronic Navigation Research Institute and the Traffic Safety and Nuisance Research Institute

Ministry of Posts and Telecommunications: FY1990 Annual Report of the Communications Research Laboratory (Communications Research Laboratory)

Ministry of Construction:

FY1990 Annual Report of the Public Works Research Institute (Public Works Research Institute)

FY1990 Annual Report of the Building Research Institute (Building Research Institute)

(2) Joint Research Projects Centered Around National Universities

The current status of joint research projects centered around national universities was published by the Ministry of Education in "FY1990 Status of Joint Research with the Private Sector" (Science and International Affairs Bureau, Ministry of Education). Our survey is based on this report.

The Ministry of Education initiated a "joint research program with the private sector and others" in 1983. In this program, national university professors and researchers from private firms jointly study a common topic as equal partners, by accepting researchers and research expenses from private firms.

There were 869 projects carried out in FY1990, involving 81 universities, 559 private firms, 1,031 private sector researchers and a total budget of ¥3.75 billion.

(3) Joint Research Projects Centered Around Regional Research Institutions

No survey data exist on the status of joint research centered around regional public research institutions. Hence, NISTEP sent questionnaires ("Survey on Effective Use of Regional Resources for Promoting Regional S&T") to various public research institutions to collect data and used the data for estimating the final results.

The content of these questionnaires is described in Chapter 8.

We used the following formulas for estimates:

$$\frac{\text{Number of joint research projects among public research institutions}}{1.38} * \frac{628}{2} = 433$$

Number of joint projects among public research institutions per institution	Total number of public research institutions
---	--

$$\frac{\text{Number of joint research projects between public research institutions and private firms}}{0.75} * \frac{628}{2} = 471$$

Number of joint projects between public research institutions and private firms per institution	Total number of public research institutions
---	--

(4) Joint Research Projects among Private Firms

Although we expected that a very large number of joint projects were in force if we included informal ones, we studied only those being carried out based on a national policy.

First, we have identified the following six systems as the implementation of the national policy that promotes joint research among private firms. The numbers in parentheses are the number of research consortia formed under these systems.

- Exploratory Research for Advanced Technology Operation Project [ERATO Project] implemented through Japan Research Corporation [JRC] (16)
- Mining Industrial Technology Research Cooperative System based on Mining Industrial Technology Research Cooperatives Law (70)
- Funding from the Basic Technology Research Facilitation System based on Basic Technology Research Facilitation Law (44)

- Funding from the Biosystem Selective Industrial Technology Research Promotion Organization System based on the Biosystem Selective Industrial Technology Research Promotion Organization Law (23)
- Funding from the Drug Side-Effect Relief and Research Promotion Fund System based on the Drug Side-Effect Relief and Research Promotion Fund Law (7)
- Small and Medium Business Consolidation Measures based on the Law for Temporary Measures to Promote the Development of New Areas by Consolidating Knowledge of Small and Medium Businesses in Different Areas (140)

7.3 Current Status of Research Consortia

As is shown in Table 7-3-1, the dominant partners of various research consortia (as of FY1990) with universities, national research institutions and regional research institutions are from the private sector, the number of consortia being 823, 554 and 471, respectively.

Partners of research consortia with regional research institutions are dominated by private firms, accounting for 471 consortia. The second most popular partners are other regional research institutions with 443 consortia. In contrast, partners from universities and national research institutions are scarce, accounting for only 28 and 16 cases, respectively. Even if we include three-party consortia for joint research by "university, private firm and regional institution," "national institution, private firm and regional institution," or "university, national institution and regional institution" and four-party consortia by "university, regional institution, private firm and regional institution," the numbers of consortia are merely 34 and 33, respectively.

Only a few cases involve joint research by three parties—industry, academia and government. Most joint research projects involve industry and university or industry and government.

We treated special corporations, such as the National Space Development Agency [NASDA], the Power Reactor and Nuclear Fuel Development Corporation [PNC], the Japan Atomic Energy Research Institute [JAERI], and the Institute of Physical and Chemical Research [RIKEN], as national research institutions.

8. Research Activities of [Regional] Public Research Institutions

We first explain in detail the objective and design of the status survey on research activities of public research institutions, and then the survey results are presented.

8.1 Survey Objective

Public research institutions have been established by local public organizations based on their administrative structures and regulations. They can be classified into agriculture-forestry-fishery, industrial, and public health and environmental institutions. Their work covers a wide range of activities, such as research, tests and analyses, and technical guidance and dissemination.

Nowadays, many local governments are aggressively examining means to promote S&T to vitalize regional [economy]. The roles of regional research institutions are also being reexamined, such as reorganizing and improving agriculture-forestry-fishery and industry-related public research institutions.

The objective of this survey is to identify current research activities of these public research institutions.

8.2 Survey Design

The design of this survey was carried out in steps: (1) Selection of institutions to be surveyed; (2) adoption of the survey method; and (3) preparation of survey cards.

(1) Selection of Institutions to Be Surveyed

A list of public research institutions to be surveyed was made using the "Nationwide List of Research Institutions" (supervised by STA, published by Lattice). This list included 628 institutions.

(2) Adoption of the Survey Method

Since the institutions to be surveyed were scattered all over Japan, we surveyed by mail.

(3) Preparation of Survey Cards

- (a) First, we listed all items that were relevant to completely understanding research activities of public research institutions, regardless of whether such items can be surveyed or not.
- (b) In making this list, we used as references newspapers, magazines and other similar surveys.
- (c) Then, items to be asked were selected, questions were improved, choices were strengthened and classification categories were adjusted according to how appropriate is a question (a question properly addresses the issue being surveyed) and how easy is a question to reply (to improve the rate of return).

8.3 Survey Implementation

This survey was carried out between January and February 1992. A total of 472 institutions replied, a return rate of 75 percent. The actual survey work was contracted out to S&T and Economics Association.

The content of the survey card, "Questionnaires for a Survey Study on Effective Use of Regional Resources for Promoting Regional S&T," and simple statistics of the survey results are listed in the appended data.

8.4 Analysis and Survey Results

(1) Number of Researchers and Staff by Prefecture

Figures 8-4-1(1) and 8-4-1(2) depict the number of researchers and the number of other staff members in research institutions in each prefecture. According to our result, Osaka Prefecture has the largest number of [non-research] staff, 1,938 persons. Hokkaido has the second largest number, 1,833 persons, which is followed by 1,783 persons in Kanagawa Prefecture, 1,225 persons in Tokyo Metropolis, and 1,120 persons in Aichi Prefecture. Hokkaido has the most researchers, 994 persons, followed by 830 persons in Tokyo Metropolis, 748 persons in Osaka Prefecture, 741 persons in Aichi Prefecture, and 629 persons in Kanagawa Prefecture. Staff members of the Osaka Prefectural Adult Disease Center and Kanagawa Prefectural Children's Clinical Center are included in our statistics, lowering the relative fraction of researchers in Osaka and Kanagawa Prefectures.

(2) Establishment Date

About one-half of public research institutions were established in 1950 or earlier.

The first ones to be established were agricultural and fishery institutions, and then industrial research institutions followed. After World War II, medical research institutions were built, and environmental institutions, including the National Institute for Environmental Studies, were established in the late 1960s.

The Basic Agricultural Law was legislated in 1961, reviving improvements of agricultural research institutions in the 1960s (Figure 8-4-2).

(3) Area of Specialty

Of the 472 institutions that replied, 90 institutions (19 percent) specialized in public health and environment, 287 institutions (60 percent) were related to agriculture, forestry and fishery, 90 institutions (19 percent) conducted industrial research, and 12 institutions (3 percent) worked in other areas.

The total number of institutions that replied did not match the sum of institutions in all areas since some institutions had sent in multiple replies.

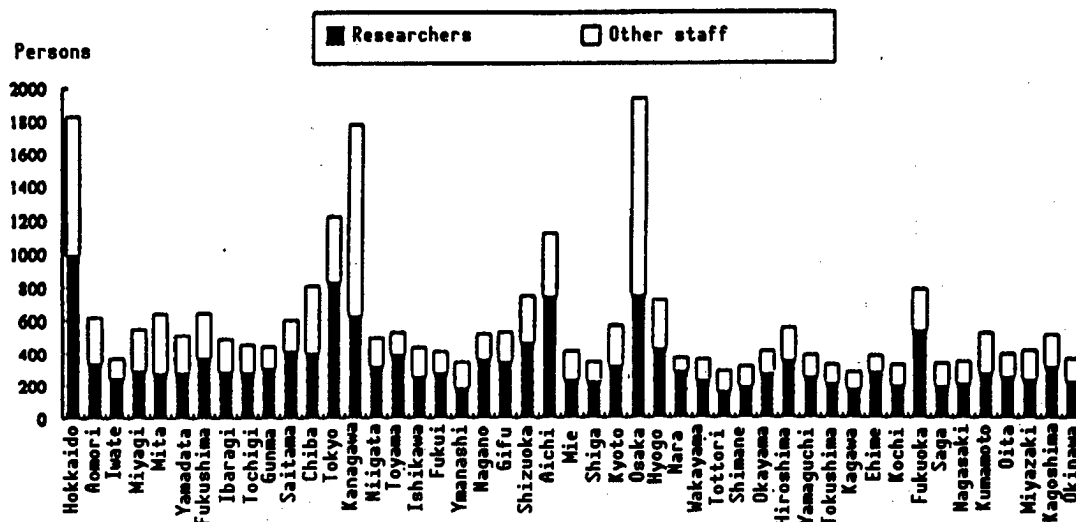


Figure 8-4-1(1). Number of Researchers and Other Staff by Each Prefecture

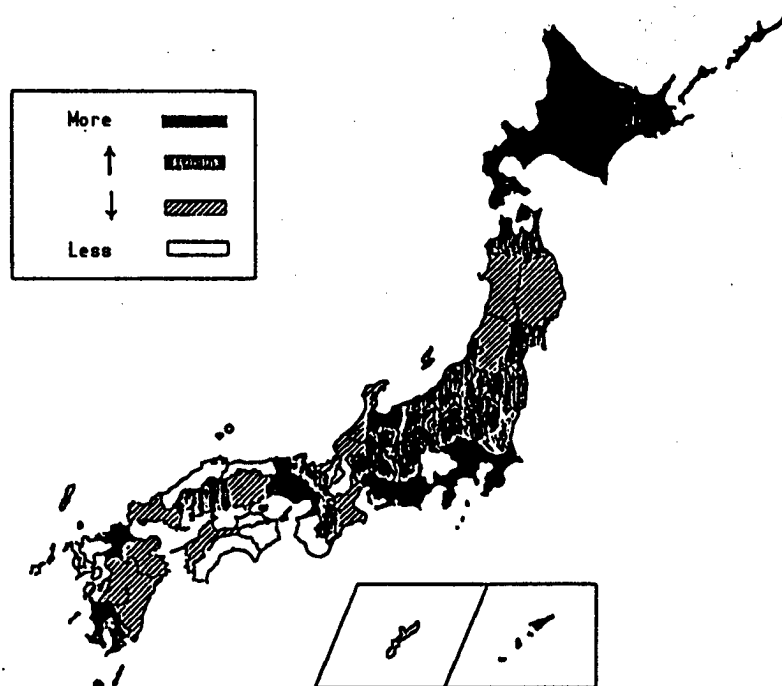


Figure 8-4-1(2). Regional Distribution of Researchers

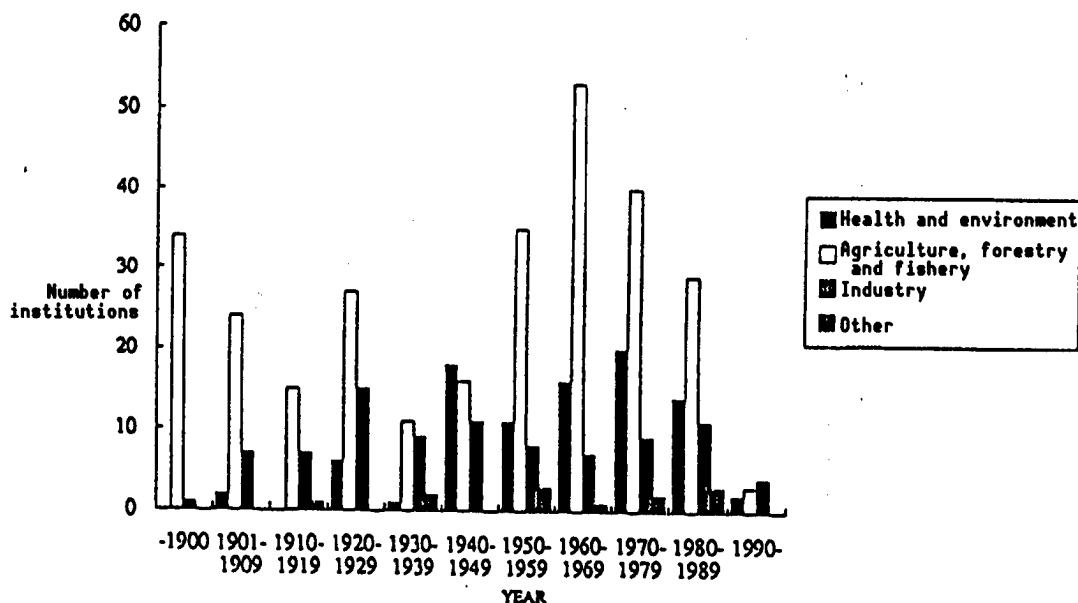


Figure 8-4-2. Trends in Establishment of Public Health Institutions

(4) Composition of Employees

The composition of employees of public welfare and environment, agriculture, forestry and fishery, and industry-related research institutions as of 1990 is explained below.

(a) Public Welfare and Environmental Research Institutions

Of the 88 institutions that replied, those with a total of "20-30" employees were the most common, accounting for 21 institutions (24 percent), followed by 16 institutions (18 percent) with "30-40" employees. Relatively small institutions with less than 50 employees accounted for 81 percent of the total (Figure 8-4-3(1)).

Among the 84 institutions that replied, those with "10-20" and "20-30" researchers were the most common, accounting for 19 institutions (23 percent) in both categories (Figure 8-4-3(2)).

Of the 47 institutions that replied, 41 institutions (91 percent) had less than 10 technicians (Figure 8-4-3(3)).

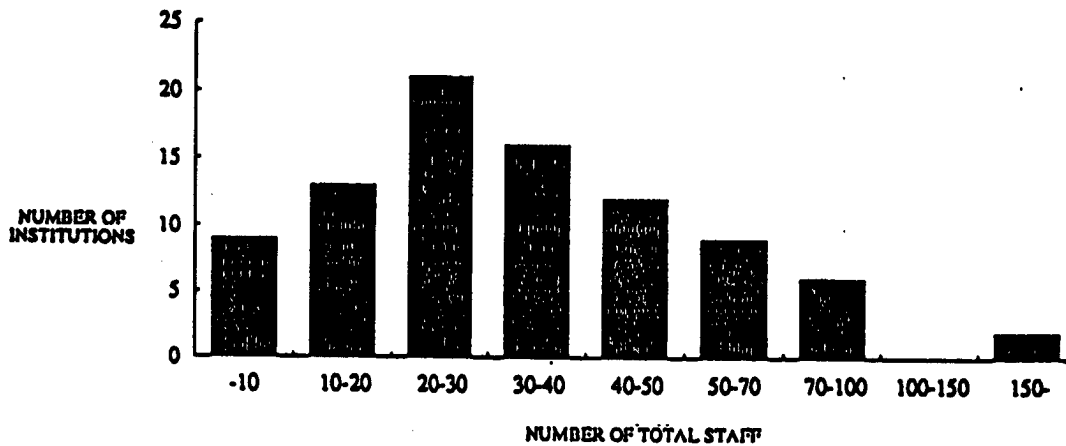


Figure 8-4-3(1). Number of Total Staff (Health and Environment)

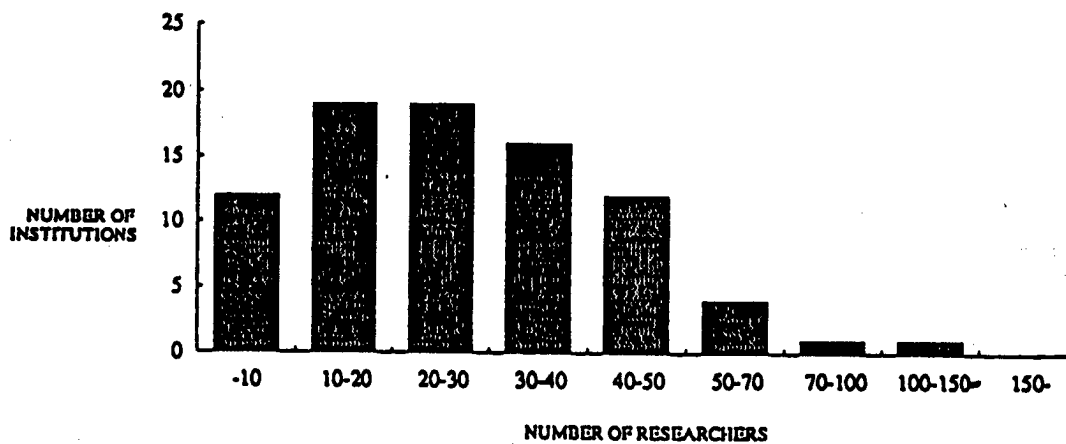


Figure 8-4-3(2). Number of Researchers (Health and Environment)

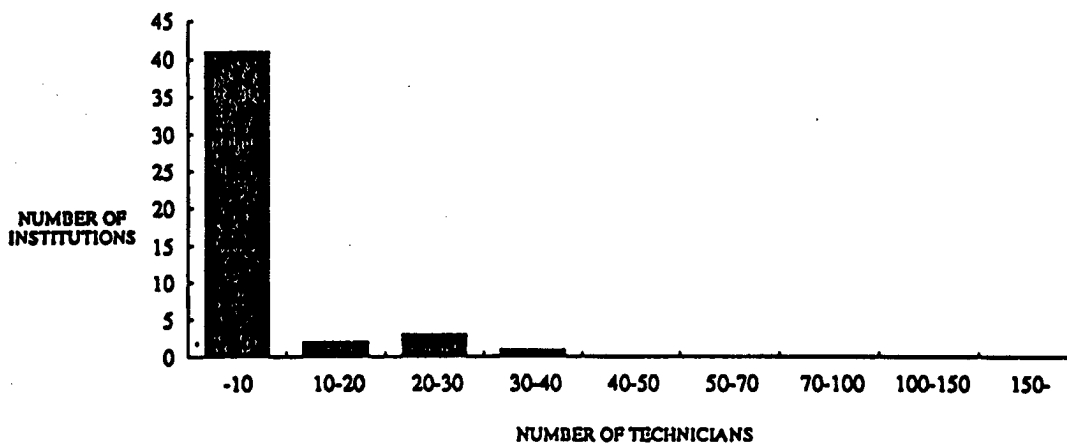


Figure 8-4-3(3). Number of Technicians (Health and Environment)

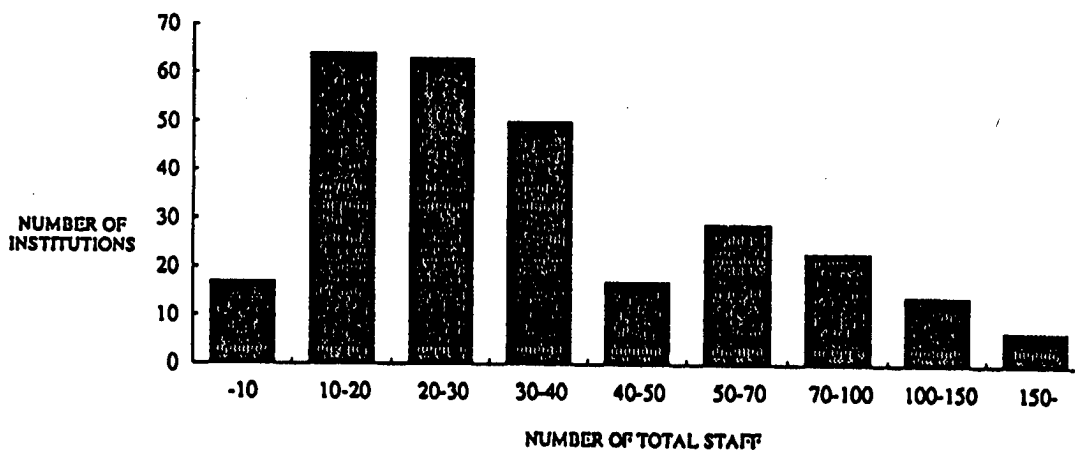


Figure 8-4-4(1). Number of Total Staff (Agriculture, Forestry and Fishery)

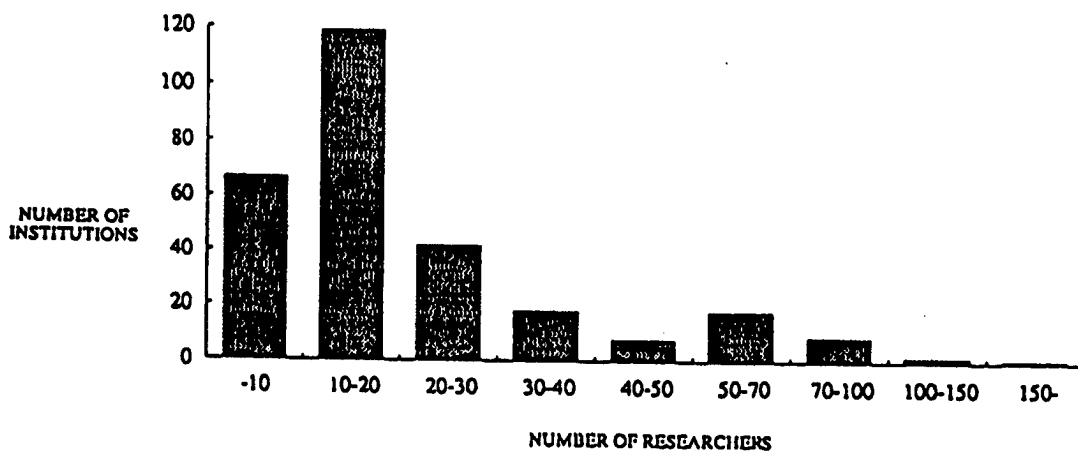


Figure 8-4-4(2). Number of Researchers (Agriculture, Forestry and Fishery)

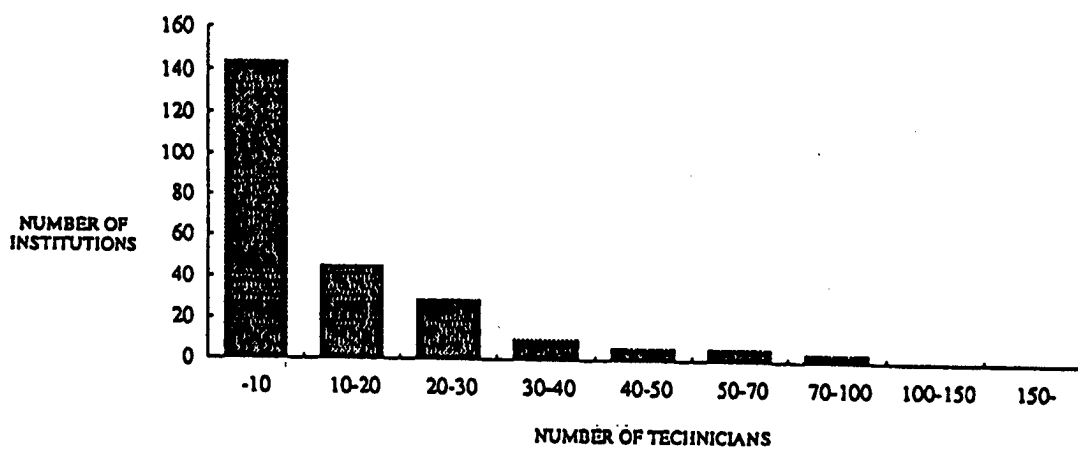


Figure 8-4-4(3). Number of Technicians (Agriculture, Forestry and Fishery)

(b) Agriculture, Forestry and Fishery Related Research Institutions

Of the 284 institutions that replied, those with a total of "10-20" employees were the most common, accounting for 64 institutions (23 percent), followed by 63 institutions (22 percent) with "20-30" employees. Relatively small institutions with less than 50 employees accounted for 74 percent of the total (Figure 8-4-4(1)).

Among the 284 institutions that replied, those with "10-20" researchers were the most common, accounting for 119 institutions (42 percent), followed by 67 institutions (24 percent) with "less than 10" researchers (Figure 8-4-4(2)).

Of the 244 institutions that replied, 144 institutions (59 percent) had less than 10 technicians (Figure 8-4-4(3)).

(c) Industrial Research Institutions

Of the 90 institutions that replied, those with a total of "10-20" employees were the most common, accounting for 25 institutions (28 percent), followed by 13 institutions (14 percent) with "20-30" employees. Relatively small institutions with less than 50 employees accounted for 79 percent of the total (Figure 8-4-5(1)).

Among the 88 institutions that replied, those with "10-20" researchers were the most common, accounting for 22 institutions (25 percent), followed by 18 institutions (20 percent) with "less than 10" researchers (Figure 8-4-5(2)).

Of the 51 institutions that replied, 47 institutions (92 percent) had less than 10 technicians (Figure 8-4-5(3)).

(5) Variations in the Number of Technicians

According to "FY1991 S&T Research Survey Report" (published in March 1992), the number of technicians per researcher in public research institutions is 0.05 person in engineering, 0.71 person in agriculture, and 0.06 person in public health. In national research institutions, this number is 0.04 person in engineering, 0.45 person in agriculture, and 0.20 person in public health.

Of the 418 institutions that replied, 228 institutions (55 percent) reported that their number of technicians did not change since 1985, while 140 institutions (33 percent) indicated that the number had decreased or had decreased slightly and 50 institutions (12 percent) replied that the number had increased or had increased slightly. (See Table 8-4-1).

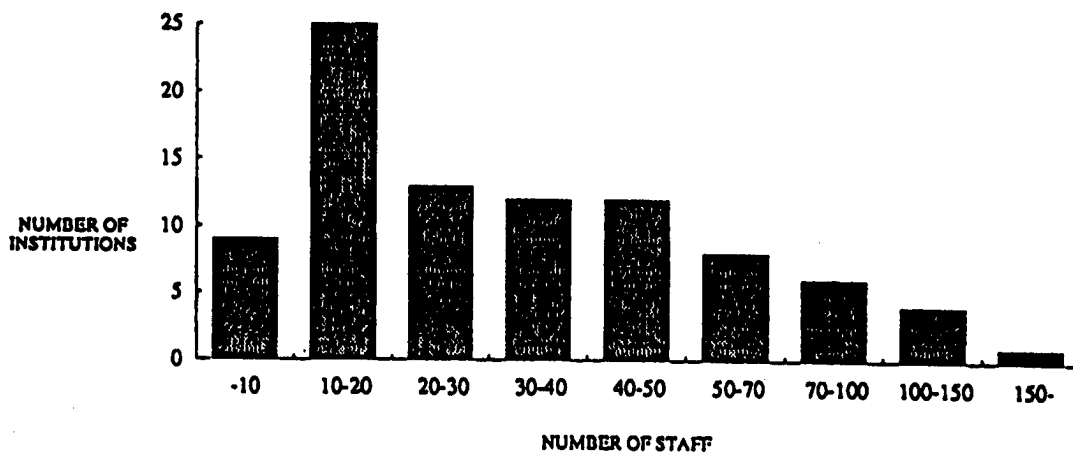


Figure 8-4-5(1). Number of Total Staff (Industry)

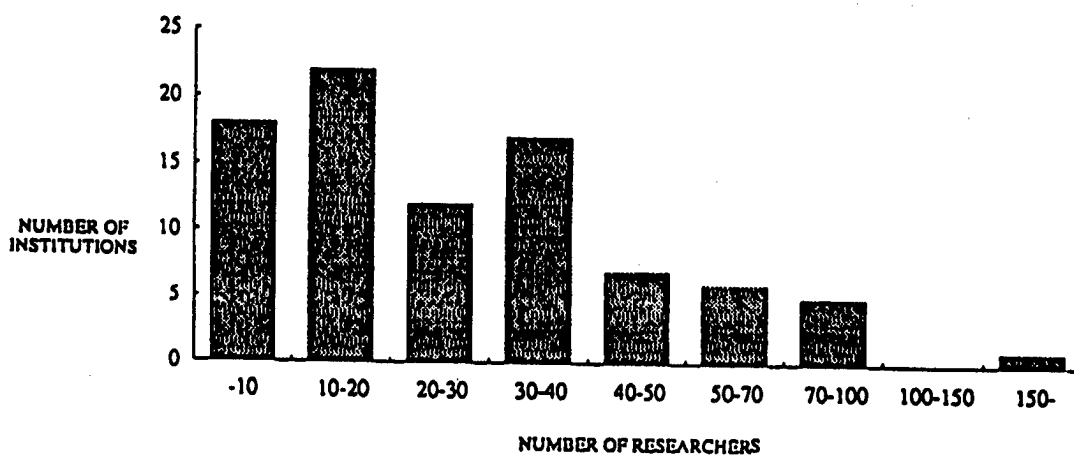


Figure 8-4-5(2). Number of Researchers (Industry)

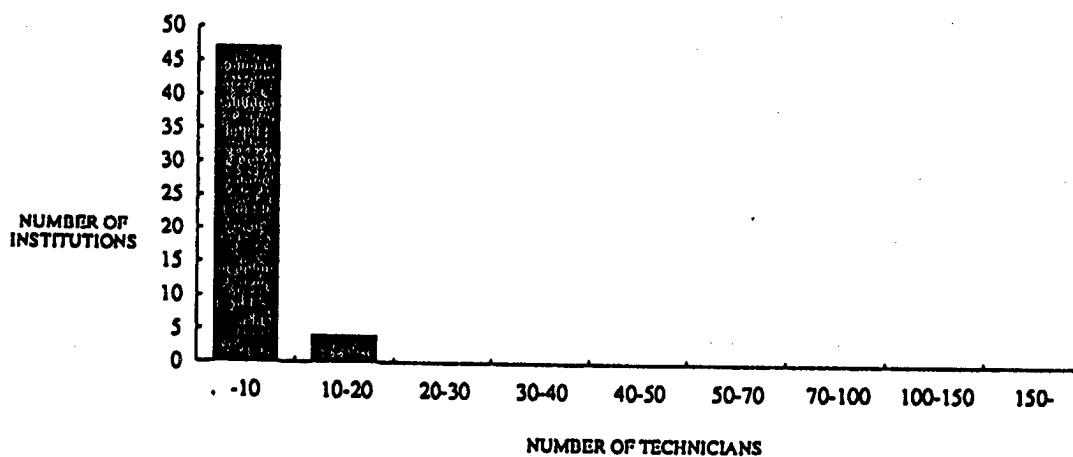


Figure 8-4-5(3). Number of Technicians (Industry)

Table 8-4-1. Changes in Number of Technicians From 1985

((%) Number of institutions (%))

	Decrease	Slight decrease	No change	Slight increase	Increase	Total
Health and environment	5 (7)	14 (20)	44 (62)	7 (10)	1 (1)	71 (100)
Agriculture, forestry and fishery	37 (14)	56 (21)	139 (52)	29 (11)	7 (3)	268 (100)
Industry	16 (21)	11 (15)	44 (58)	5 (7)	0 (0)	76 (100)
Total	59 (14)	81 (19)	228 (55)	42 (10)	8 (2)	418 (100)

(6) Age Distribution

Trends in the age distribution of employees of research institutions in public health and environment, agriculture, forestry and fishery, and in industry-related work are shown below.

Estimates for the year 2000 were obtained in the following manner:

- (i) The total number of researchers is the same as that in 1990.
- (ii) The distributions of researchers 35-45 years old and those 45-55 years old in 2000 is the same as the distributions in 1990 of researchers 25-35 years old and those 35-45 years old.
- (iii) The percentage of researchers 55 years old or older was calculated by the following formula:

The percentage of researchers 45-55 years old (in 1990) [to the total]
 × the percentage of researchers 55 years old or older (in 1990)
 / the percentage of researchers 45-55 years old (in 1980).

- (iv) The distribution of researchers 25 years old or younger was calculated as follows:

(The percentage of researchers 25 years old or younger (in 1980)
 + the percentage of researchers 25 years old or younger (in 1990)) / 2.

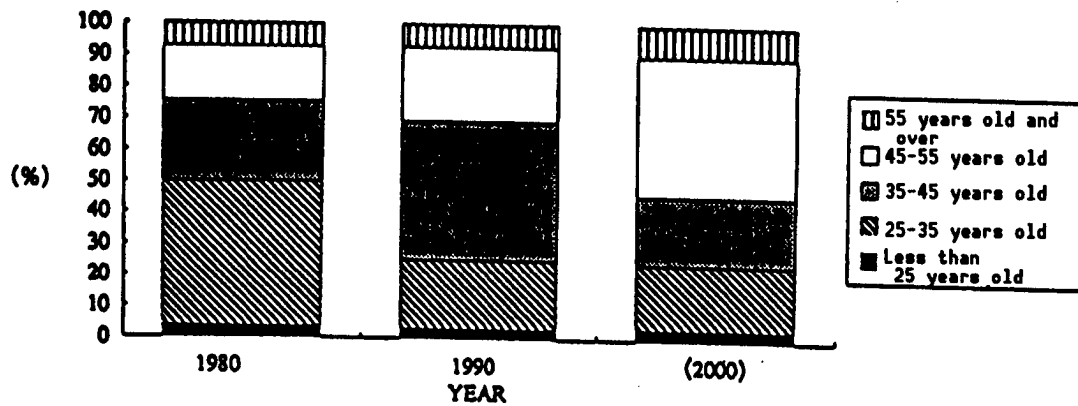


Figure 8-4-6(1). Age Structure (Health and Environment)

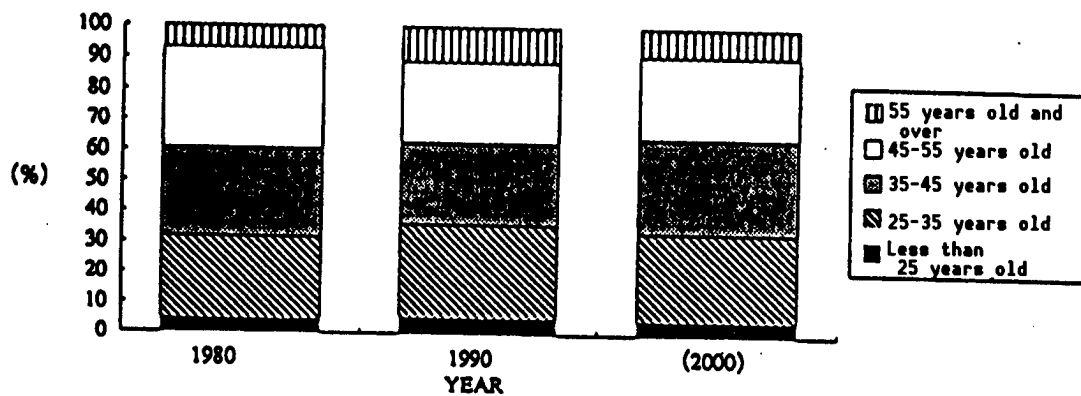


Figure 8-4-6(2). Age Structure (Agriculture, Forestry and Fishery)

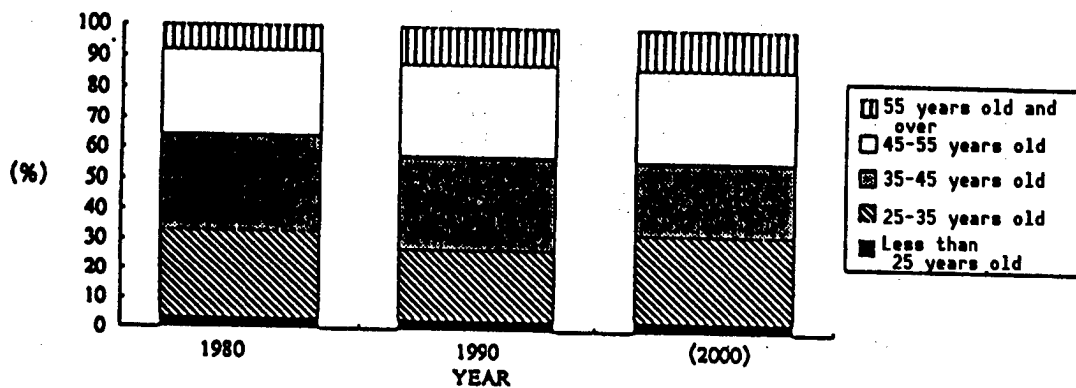


Figure 8-4-6(3). Age Structure (Industry)

(a) Public Health and Environmental Research Institutions

The average age (as of 1990) of researchers in all institutions is 40.5 years old.

In 1980, researchers 45 years old or older constituted 25 percent of all researchers, while this percentage increased slightly to 31 percent in 1990.

Also, as of 1990, the share of researchers 35-45 years old is relatively high, 44 percent. We expect that the percentage of researchers 45 years old and older will rapidly rise in the next 10 years (Figure 8-4-6(1)).

(b) Agriculture, Forestry and Fishery Related Research Institutions

The average age (as of 1990) of researchers in all institutions is 40.5 years old.

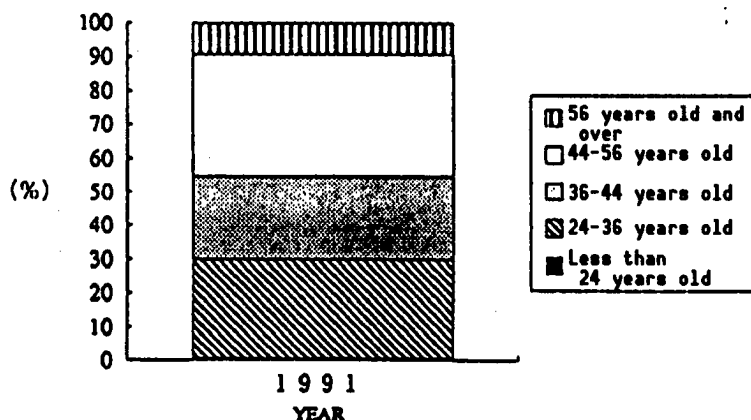


Figure 8-4-6(4). Age Structure (National Research Institution)

In 1980, researchers 45 years old or older constituted 40 percent of all researchers, while this percentage improved to 37 percent in 1990, indicating change of generation (Figure 8-4-6(2)).

(c) Industrial Research Institutions

The average age (as of 1990) of researchers in all institutions is 41.8 years old.

In 1980, researchers 45 years old or older constituted 36 percent of all researchers, while this percentage increased to 42 percent in 1990. Institutions in this category has a higher distribution of older researchers compared to institutions in public health and environment or those in agriculture, forestry and fishery (Figure 8-4-6(3)).

(d) Comparisons to National Research Institutions

According to a "Survey of National Government Employee Compensations" by the National Personnel Authority, the average age of researchers employed by the central government is 42.3 years old (as of 15 January 1991).

Age distributions cannot be compared accurately because statistical classifications are not the same, but we find that the researchers in [regional] public research institutions are somewhat younger than those in national research institutions, because researchers 44 years old and older and employed by the central government constitute 44 percent of the total as of 15 January 1991 (Figure 8-4-6(4)).

(7) Educational Level and Holders of Doctorate

Trends in educational level and the number of researchers with doctorate degrees in public health and environment, agriculture, forestry and fishery, and industry related research institutions are shown below.

(a) Public Health and Environmental Research Institutions

The educational level of employees in these institutions are improving steadily. As of 1990, 22 percent of all researchers held a master's degree or a doctorate, while 67 percent finished undergraduate, 10 percent graduated from a high school or junior college, and 1 percent had other types of education (Figure 8-4-7(1)).

Of the 87 institutions that replied, 58 institutions (67 percent) had researchers with doctorate, while 10 institutions had 10 or more doctorate holders. The average number of doctorate researchers per institution, which was obtained by dividing the total number of doctorate holders by the number of institutions that replied, was 3.82 persons.

(b) Agriculture, Forestry and Fishery Related Research Institutions

The educational level of employees in these institutions are improving steadily. As of 1990, 15 percent of all researchers held a master's degree or a doctorate, while 71 percent finished undergraduate, 13 percent graduated from a high school or junior college, and 1 percent had other types of education (Figure 8-4-7(2)).

Of the 277 institutions that replied, 109 institutions (39 percent) had researchers with doctorate, but only 4 institutions had 10 or more doctorate holders. The average number of doctorate researchers per institution, which was obtained by dividing the total number of doctorate holders by the number of institutions that replied, was 0.95 persons.

(c) Industrial Research Institutions

The educational level of employees in these institutions are improving steadily. As of 1990, 14 percent of all researchers held a master's degree or a doctorate, while 58 percent finished undergraduate, 26 percent graduated from a high school or junior college, and 2 percent had other types of education (Figure 8-4-7(3)).

Of the 88 institutions that replied, 29 institutions (33 percent) had researchers with doctorate, but only 2 institutions had 10 or more doctorate holders. The average number of doctorate researchers per institution, which was obtained by dividing the total number of doctorate holders by the number of institutions that replied, was 1.24 persons.

(d) Comparisons to National Research Institutions

According to a survey requested by STA to other government agencies in July 1991, 15 percent of all researchers [in national research institutions] held a doctorate, 35 percent held a master's degree, 35 percent held a bachelor's degree, 15 percent graduated from a high school or junior college, and 1 percent had other types of education, as of 1 July 1991. This is a higher level of education than the employees of public research institutions (Figure 8-4-7(4)).

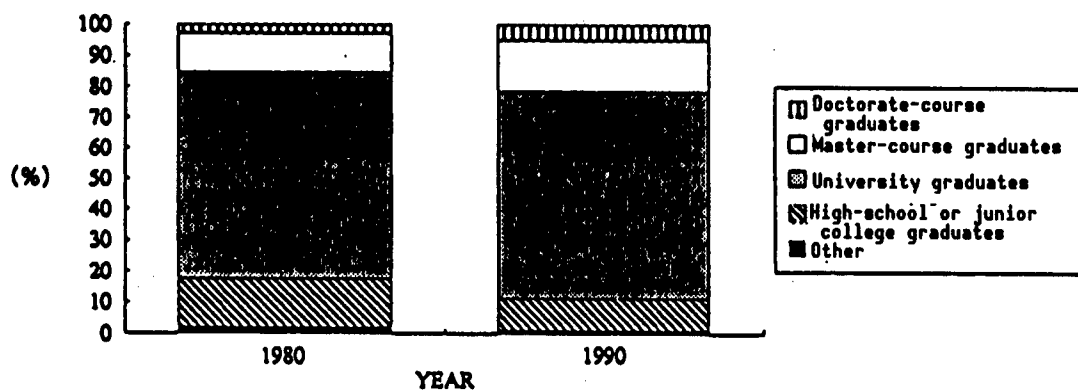


Figure 8-4-7(1). School Career Structure (Health and Environment)

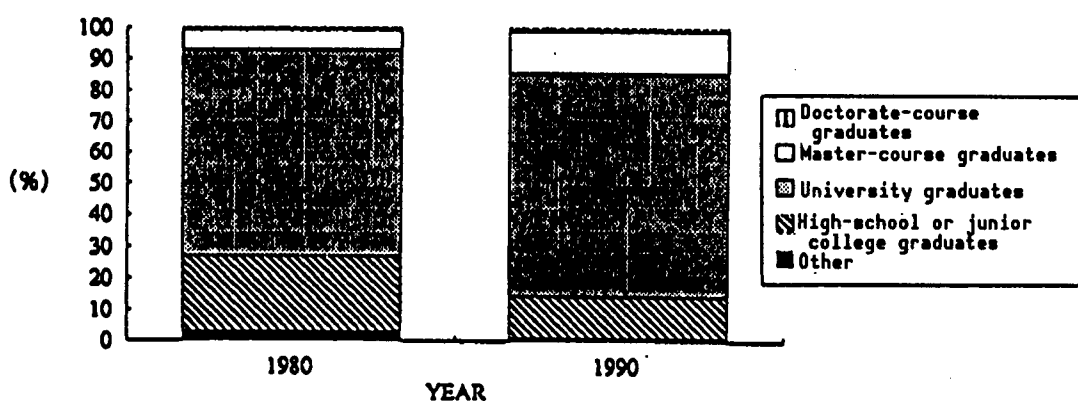


Figure 8-4-7(2). School Career Structure (Agriculture, Forestry and Fishery)

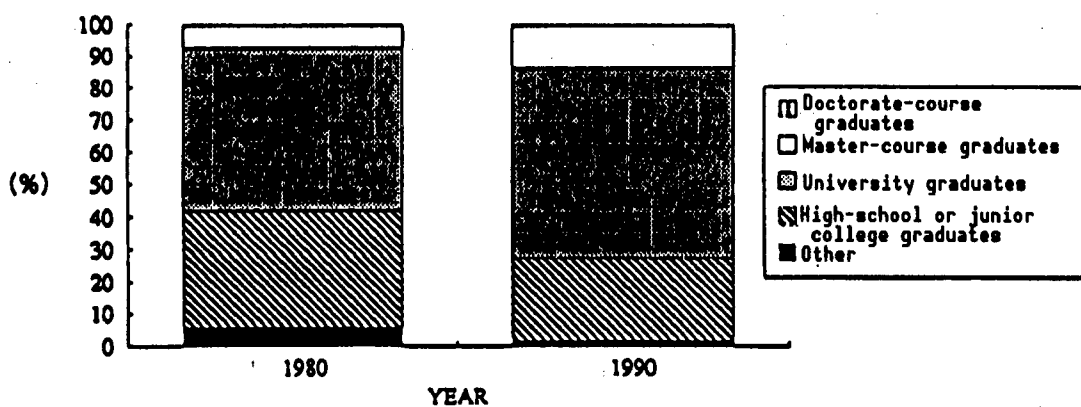


Figure 8-4-7(3). School Career Structure (Industry)

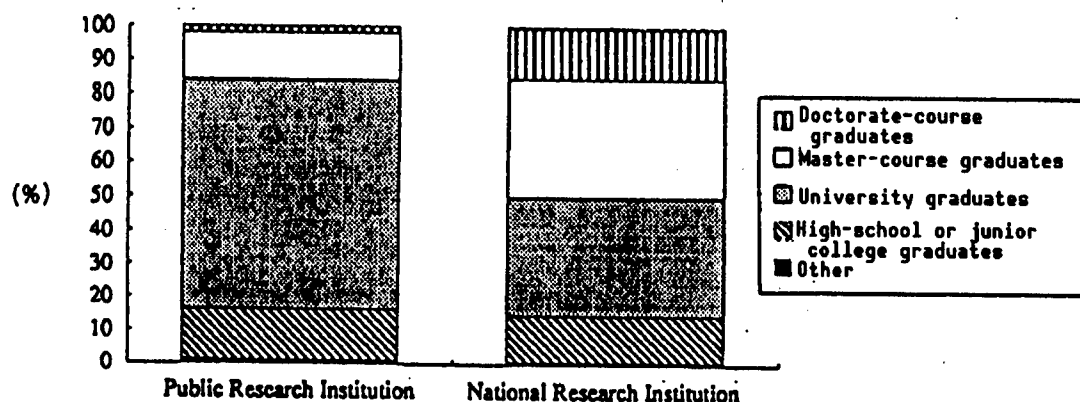


Figure 8-4-7(4). School Career Structure (Public Research Institution and National Research Institution)

(8) Structures, Researcher Compensation, and Other Matters

We indicate structures, researcher compensation and other matters below.

(a) Large-Scale Reorganization

Of the 466 institutions that replied, 161 institutions (35 percent) experienced large-scale reorganizations (Table 8-4-2).

Table 8-4-2. Major Reorganization of Public Research Institutions
((%) Number of institutions (%))

Reorganized	161 (35)
Not reorganized	305 (65)
Total	466 (100)

(b) Establishment of Planning and Coordinating Offices

Of the 380 institutions that replied, only 62 institutions (16 percent) had planning and coordinating offices in 1977. However, 120 institutions (27 percent) of the 444 institutions that replied had such offices by 1990 (Table 8-4-3).

Table 8-4-3. Establishment of Planning and Coordinating Divisions
((%) Number of institutions (%))

	1977	1984	1990
Established	62 (16)	86 (21)	120 (27)
Not established	318 (84)	322 (79)	324 (73)
Total	380 (100)	408 (100)	444 (100)

(c) Average Annual Salary (at Age 30)

Among the 433 institutions that replied, "¥4 million or more but less than ¥4.5 million" was the most common answer, accounting for 198 institutions (46 percent) (Figure 8-4-8).

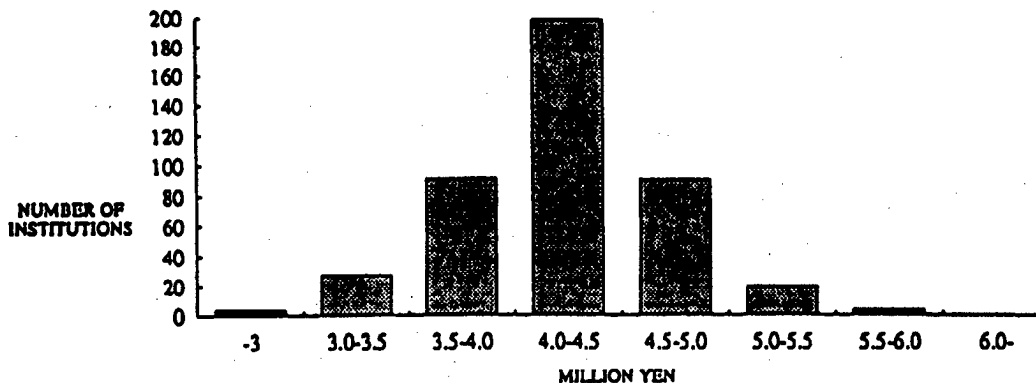


Figure 8-4-8. Average Annual Salary (30-year-olds)

(d) Periodic Shift in Personnel Assignments

Of the 426 institutions that replied, 290 institutions (68 percent) did not have any periodic shift in personnel assignments (Table 8-4-4).

Table 8-4-4. Secondment of Researchers at Fixed Periods

((%) Number of institutions (%))

	1977	1984	1990
Perform	104 (29)	125 (32)	136 (32)
Not perform	255 (71)	261 (68)	290 (68)
Total	359 (100)	386 (100)	426 (100)

(e) Hiring or Transferring of Researchers From or to Other Research Institutions

Hiring or transferring of researchers from or to other institutions was rare. Of the 453 institutions that replied, 335 institutions (74 percent) did not hire from other institutions, while 346 institutions (77 percent) out of the 449 institutions that replied did not transfer anyone to other institutions (Table 8-4-5).

(f) Research Institutions with Foreign Researchers

Research institutions that had hosted foreign researchers were rare. Even those which had hosted such researchers, the researchers were mostly engaged in short-term studies of 3 months to a year (Table 8-4-6).

Table 8-4-5. Hosting of Researchers From Outside Institutions and Secondment of Researchers

((%) Number of institutions (%))

Hosting of researcher from outside institutions	Number of researchers	Secondment of researcher to other institutions
335 (74)	0	346 (77)
54 (12)	1	51 (11)
27 (6)	2	18 (4)
20 (4)	3	16 (4)
4 (1)	4	10 (2)
3 (1)	5	2 (0)
4 (1)	6	3 (1)
3 (1)	7	0 (0)
0 (0)	8	2 (0)
1 (0)	9	1 (0)
2 (0)	10-	0 (0)
453 (100)	Total	449 (100)

While hosting foreign researchers for 3 months to a year, 13 institutions provided housing assistance and eight institutions paid them better [than comparable Japanese researchers].

(g) Maintenance and Improvement of Research Potential

Among the 1091 replies (respondents were asked to choose three answers from a list for each question), "researchers' education and training" was the most popular (326 replies), followed by "more researchers" (210 replies), "mobility for researchers, personnel exchange with other institutions" (131 replies) and "improved compensation including promotions" (119 replies) (Figure 8-4-9).

Table 8-4-6. Research Institutions Hosting Foreign Researchers

	No. of institutions	Ratio (%)	No. of persons
1 month	2	0	3
1-3 months	5	1	13
3 months-1 year	31	7	48
1-2 years	2	0	2
Regular	0	0	0
No foreign researchers	416	92	0
Total	456	100	66

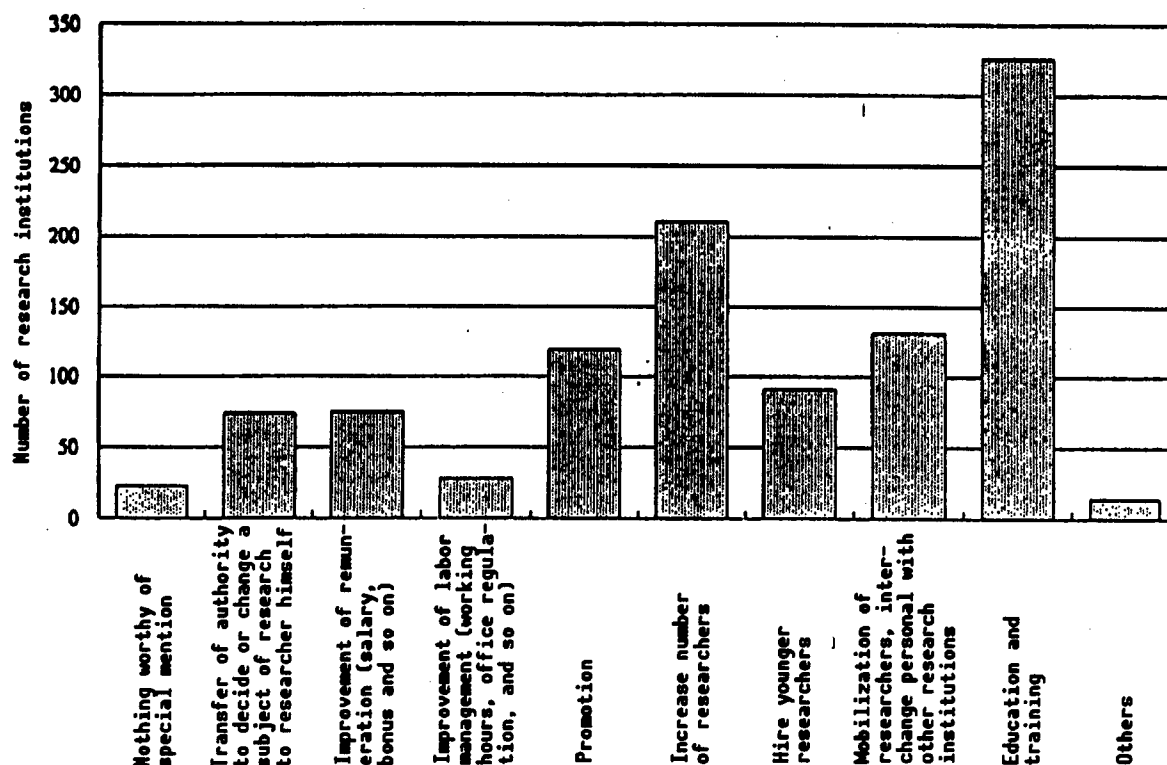


Figure 8-4-9. Maintenance and Improvement of Research Potential

(9) Status of Testing and Measuring Instruments

(a) Status of Testing and Measuring Instruments Classified According to Applications

Among the research institutions in public health and environment, an average of 84 institutions replied, though there were minor differences depending on the prices paid for instruments. The number of testing and measuring instruments per institution was 162 instruments that cost "¥200,000 to ¥1 million," 53 instruments that cost "¥1 million to ¥3 million," but only five instruments that cost "¥10 million or more."

Among the research institutions in agriculture, forestry and fishery, an average of 259 institutions replied, though there were minor differences depending on the prices paid for instruments. The number of testing and measuring instruments per institution was 88 instruments that cost "¥200,000 to ¥1 million," 25 instruments that cost "¥1 million to ¥3 million," but only two instruments that cost "¥10 million or more."

Among industrial research institutions, an average of 79 institutions replied, though there were minor differences depending on the prices paid for instruments. The number of testing and measuring instruments per institution was 122 instruments that cost "¥200,000 to ¥1 million," 65 instruments that cost "¥1 million to ¥3 million," and 15 instruments that cost "¥10 million or more." The last category was much larger than its counterparts in public health and environmental research institutions and agriculture, forestry and fishery related research institutions (Figure 8-4-10(1)).

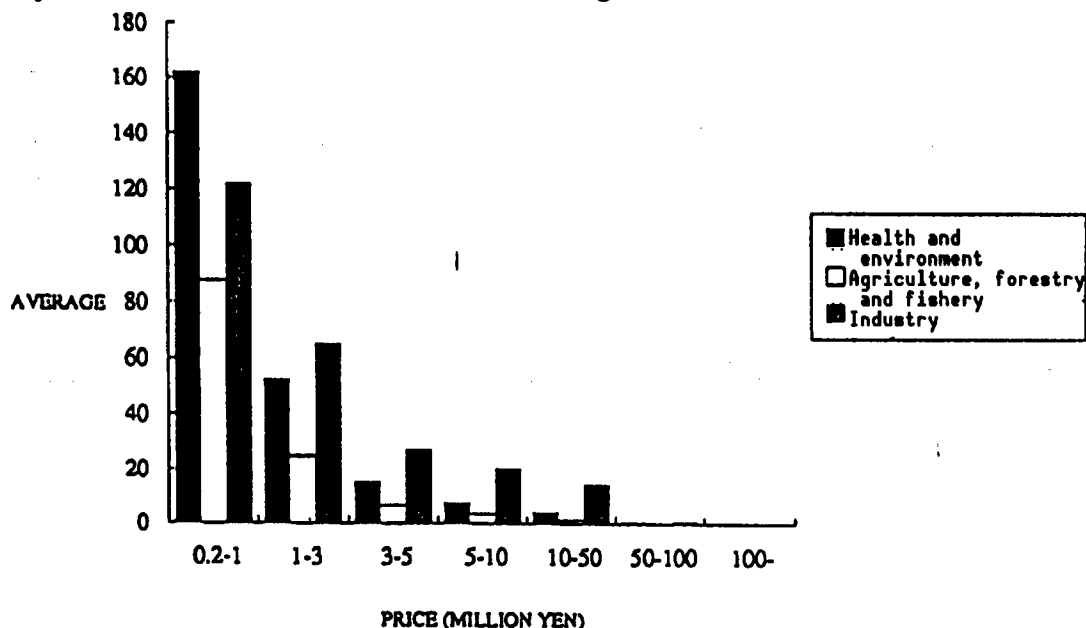


Figure 8-4-10(1). Number of Testing and Measuring Instruments

(b) Status of Testing and Measuring Instruments Classified by Prefecture

The status of testing and measuring instruments in each prefecture cannot be compared precisely because not all public research institutions replied (reply rate of 65 percent), but we could still see some trends.

Nagano Prefecture had the largest number, 25 instruments, that cost ¥10 million or more, followed by 119 instruments in Aichi Prefecture, 107 instruments in Hyogo Prefecture, 105 instruments in Shizuoka Prefecture, and 98 instruments in Fukuoka Prefecture (Figures 8-4-10(2) and 8-4-10(3)).

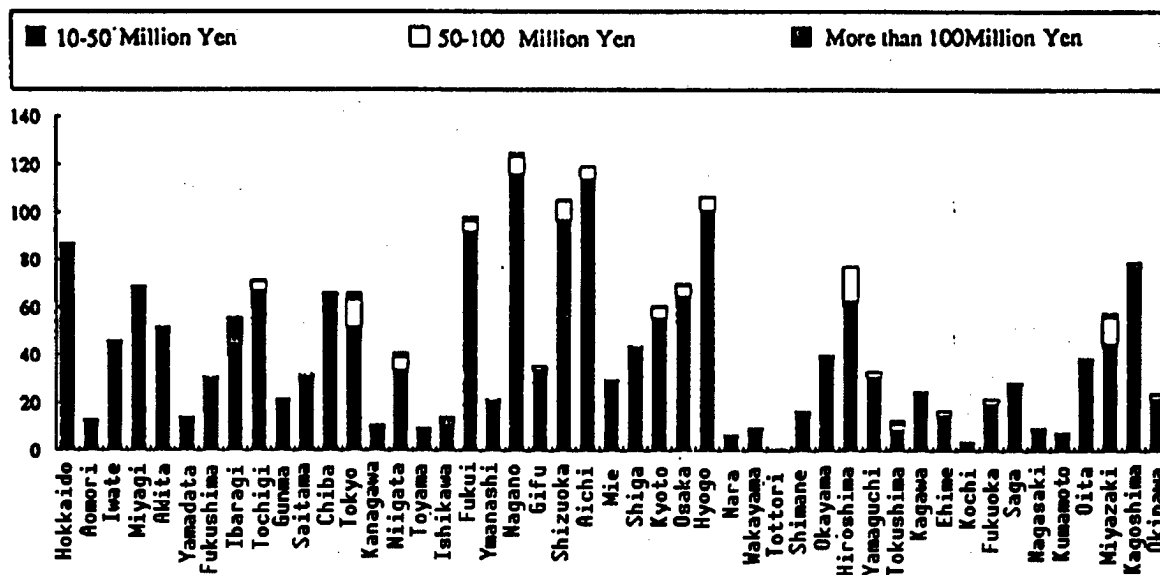


Figure 8-4-10(2). Number of Testing and Measuring Instruments by Prefecture

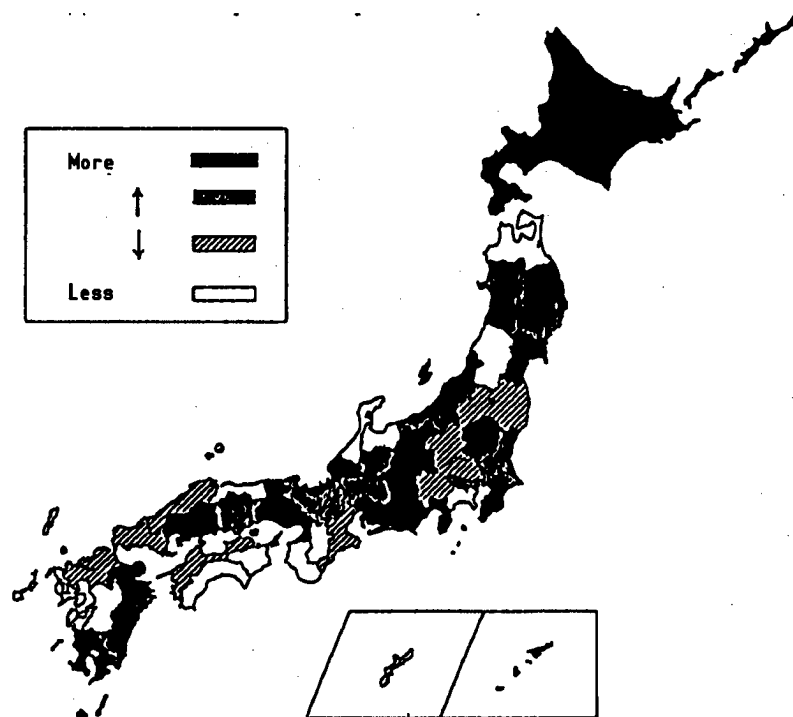


Figure 8-4-10(3) Number of Testing and Measuring Instruments by Prefecture

(10) Research and Development, Technical Guidance and Consulting, Analyses and Tests by Request

Research and development, technical guidance and consulting, and analyses and tests by request conducted by public research institutions during FY1990 are summarized below.

(a) Research and Development

Among the 49 public health and environmental research institutions that replied, the largest number, 18 institutions (37 percent), had "0 to 10 R&D projects," followed by 13 institutions (27 percent) with "20-30 projects," and 10 institutions (20 percent) with "10-20 projects."

Among the 229 agriculture, forestry and fishery related research institutions that replied, the largest number, 74 institutions (32 percent), had "0 to 10 R&D projects," followed by 55 institutions (24 percent) with "10-20 projects."

Among the 86 industrial research institutions that replied, the largest number, 33 institutions (38 percent), had "0 to 10 R&D projects," followed by 21 institutions (24 percent) with "10-20 projects" (Table 8-4-7).

Table 8-4-7. Changes in Number of R&D Projects by Public Research Institutions
(No. of institutions)

No. of R&D projects	Health and environment			Agriculture, forestry and fishery			Industry		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
0-10	15	17	18	61	67	74	26	34	33
10-20	10	16	10	48	45	55	19	18	21
20-30	5	6	13	29	36	36	11	12	17
30-40	5	2	0	19	20	22	3	3	5
40-50	0	3	5	10	15	14	4	2	5
50-60	2	0	2	3	4	8	2	2	1
60-70	0	0	0	4	1	2	0	1	1
70-80	0	0	0	0	0	5	0	1	0
80-90	0	0	0	2	3	1	0	0	1
90-100	0	0	0	4	1	2	0	0	0
100~	0	1	1	8	12	10	2	2	2
Total	37	45	49	188	204	229	67	75	86

STA collected data from research articles, which were stored in the S&T article file maintained by the Japan Information Center of Science and Technology [JICST], and classified them according to public research institutions in each prefecture. According to the STA statistics, institutions in Osaka Prefecture

had the largest average number, 527, of articles published between 1987 and 1990, followed by 512 articles from Tokyo Metropolis, 458 articles from Hokkaido, 387 articles from Aichi Prefecture, and 330 articles from Shizuoka Prefecture. In the average number of annual publications per researcher between 1987 and 1990, Ibaraki Prefecture led this category with 0.76 article per person, followed by 0.71 article from Tochigi and Shizuoka Prefectures, respectively, 0.70 article from Osaka Prefecture, and 0.68 article from Saitama Prefecture (Figures 8-4-11(1), 8-4-11(2) and 8-4-11(3)).

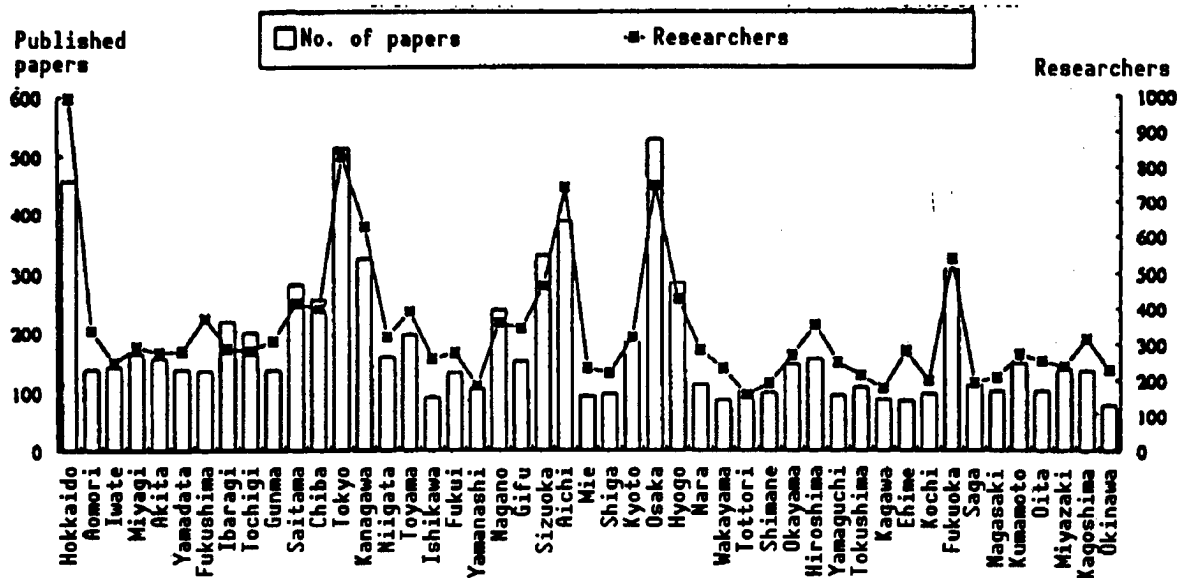


Figure 8-4-11(1). Average Number of Papers Published in 1987-1990 and Number of Researchers by Prefecture

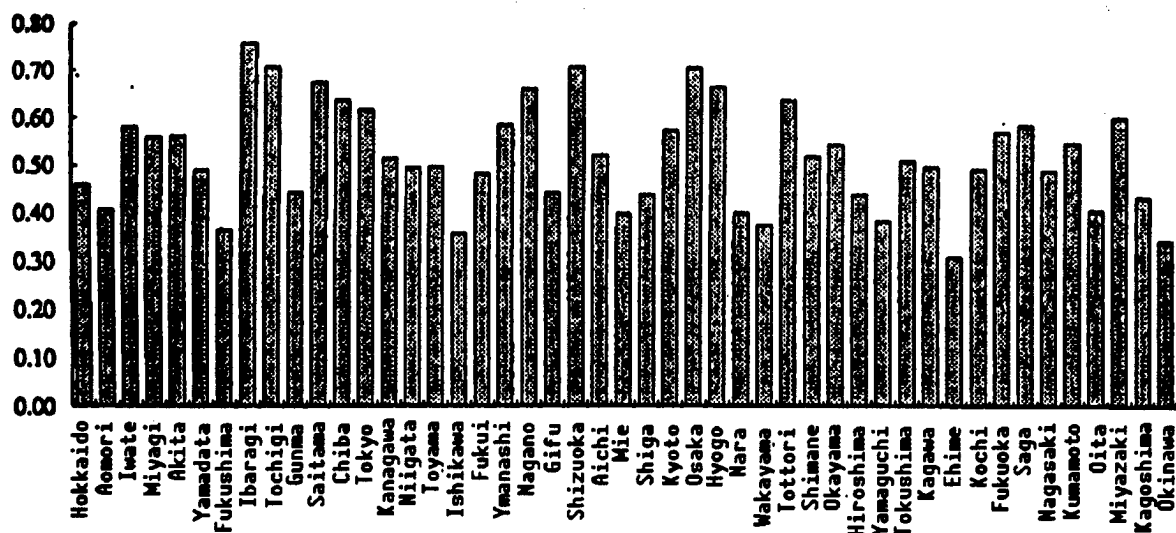


Figure 8-4-11(2). Average Number of Papers Published in 1987-1990 by Researchers Per Capita

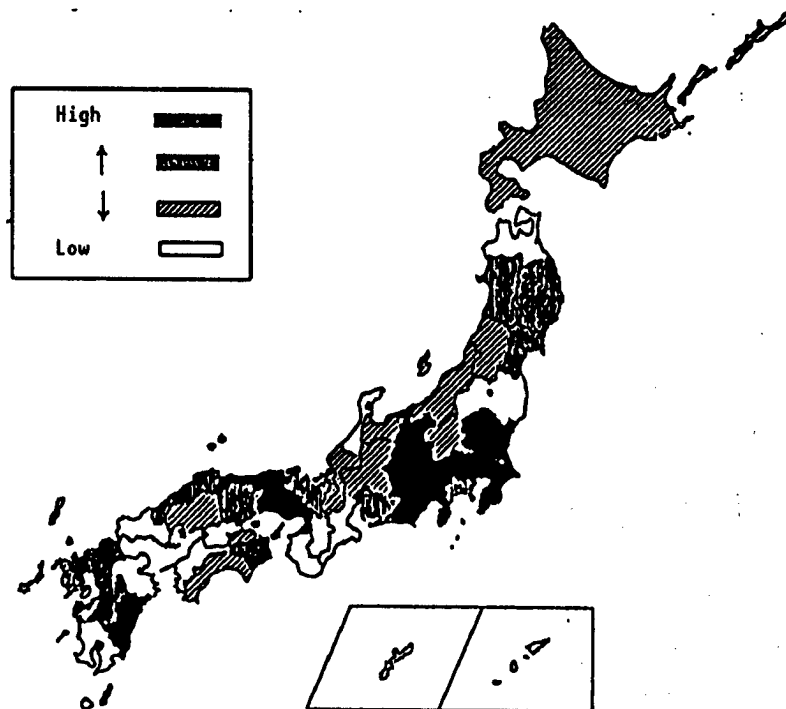


Figure 8-4-11(3). Average Number of Papers Published in 1987-1990 by Researcher per Capita

(b) Technical Guidance and Consulting

Replies to our survey concerning technical guidance and consulting activities showed large fluctuations, in particular in activities related to public health and environment and to agriculture, forestry and fishery. These fluctuations resulted since the types work performed by institutions in the public health and environment category were different depending on whether an institution was health or environment oriented. Similar situation applied also to institutions grouped as agriculture, forestry and fishery related.

Hence, we limited our analysis to industrial research institutions, which had relatively minor fluctuations, although even here institutions oriented toward textile and those toward machinery performed different types of work (Table 8-4-8(1)).

Among the 90 industrial research institutions that replied, the largest number, 32 institutions (36 percent), handled "0-1,000 cases" of guidance and consulting, followed by 14 institutions (16 percent) with "1,000-2,000 cases," and 13 institutions (14 percent) with "2,000-3,000 cases" (See Figure 8-4-12(1)).

Table 8-4-8(1). Distribution of Technical Consulting Cases by Public Research Institutions

(No. of institutions)

Cases	Health and environment			Agriculture, forestry and fishery			Industry		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
0~1,000	20	28	29	140	154	176	23	25	32
1,000~2,000	2	0	3	6	10	12	13	16	14
2,000~3,000	0	0	0	3	2	2	15	12	13
3,000~4,000	0	0	0	1	1	2	7	9	12
4,000~5,000	0	0	0	0	0	1	2	3	3
5,000~6,000	0	0	0	1	0	0	3	2	3
6,000~7,000	0	0	0	0	2	0	1	5	2
7,000~8,000	0	0	0	0	0	2	2	3	4
8,000~9,000	0	0	0	0	0	1	3	0	1
9,000~10,000	0	0	0	0	1	0	1	0	0
10,000~	1	1	1	1	0	2	3	4	6
Total	23	29	33	152	171	198	72	79	90

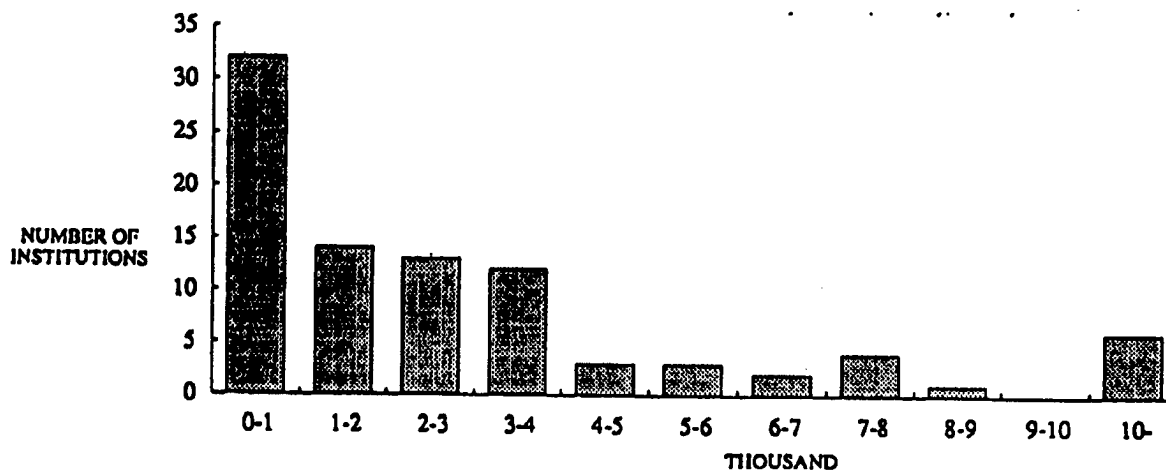


Figure 8-4-12(1). Number of Technical Consultancy Cases (Industry, 1990)

(c) Analyses and Tests by Request

Large fluctuations were also observed in replies concerning analyses and tests by request conducted by public research institutions for the same reasons that such fluctuations were observed in (b) above (Table 8-4-8 (2)).

Table 8-4-8(2). Distribution of Analyses and Tests Requested to Public Research Institutions

(No. of institutions)

Analysis	Health and environment			Agriculture, forestry and fishery			Industry		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
0~1,000	12	16	20	137	153	181	15	17	23
1,000~2,000	5	3	4	2	4	4	7	11	12
2,000~3,000	2	1	0	0	0	1	2	2	7
3,000~4,000	0	1	3	0	0	0	2	6	6
4,000~5,000	1	0	0	0	0	0	7	1	6
5,000~6,000	1	3	2	0	0	0	4	5	8
6,000~7,000	2	1	0	0	0	0	4	6	7
7,000~8,000	0	0	0	0	0	1	2	2	3
8,000~9,000	0	1	0	0	0	0	1	7	1
9,000~10,000	2	0	2	1	0	0	3	2	2
10,000~	16	29	31	0	1	1	25	19	14
Total	41	55	62	140	158	188	72	78	89

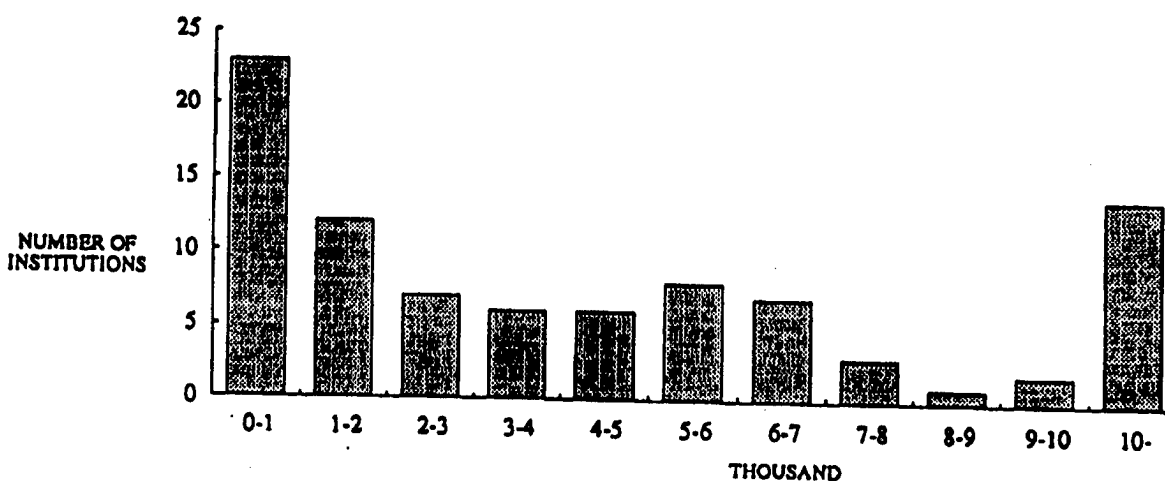


Figure 8-4-12(2). Number of Analyses Requested (Industry, 1990)

As indicated in Figure 8-4-12 (2), among the 89 industrial research institutions that replied, 23 institutions (26 percent) performed "0-1,000 cases" of analyses and tests requested, followed by 12 institutions (13 percent) with "1,000-2,000 cases," 7 institutions (8 percent) with "2,000-3,000 cases," and 6 institutions (7 percent) performed "3,000-4,000 cases."

(11) Cooperative Research Projects

Cooperative research projects carried out by public research institutions in FY1990 are summarized below.

(a) Number of Cooperative Research Projects

Among the 62 public health and environmental research institutions that replied, 47 institutions (76 percent) were partners in cooperative research projects. Of the 47 institutions, 25 institutions (53 percent of all institutions engaged in cooperative projects) took part in three or less cooperative research projects.

Among the 197 agriculture, forestry and fishery related research institutions that replied, 140 institutions (71 percent) were partners in cooperative research projects. Of the 140 institutions, 78 institutions (56 percent of all institutions engaged in cooperative projects) took part in two or less cooperative research projects.

Among the 67 industrial research institutions that replied, 46 institutions (69 percent) were partners in cooperative research projects. Of the 46 institutions, 27 institutions (59 percent of all institutions engaged in cooperative projects) took part in four or less cooperative research projects (Figure 8-4-13).

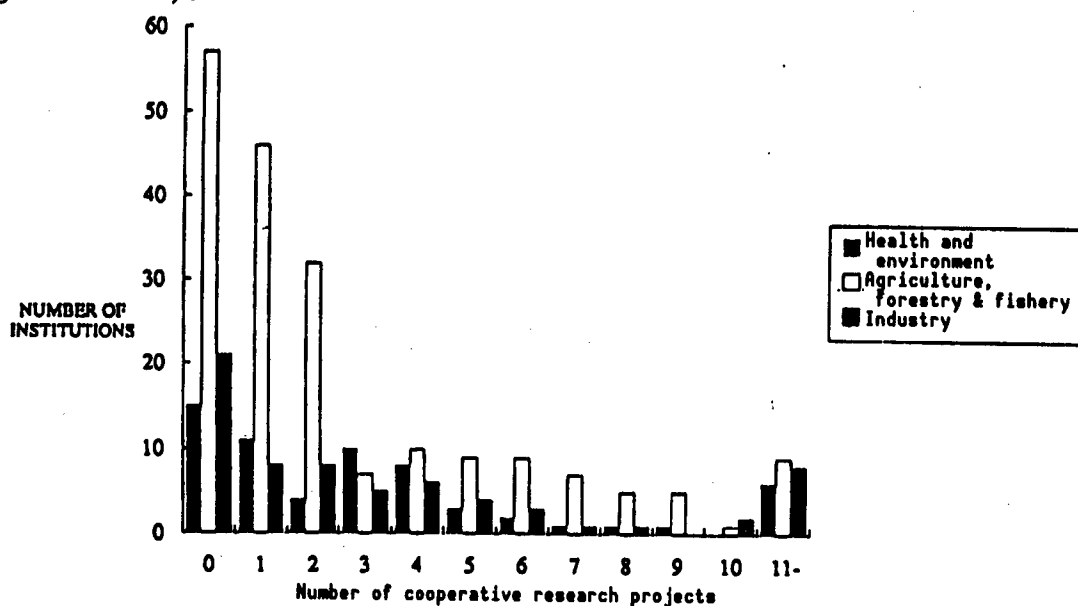


Figure 8-4-13. Numbers of Research Institutions and Cooperative Research Projects (1990)

(b) Partners in Cooperative Research Projects

Public health and environmental research institutions had the largest number, 1.36 projects, of cooperative research per institution with "universities," followed by 1.05 projects with "national research institutions," and 1.03 projects with "public research institutions."

Agriculture, forestry and fishery related research institutions had the largest number, 1.68 projects, of cooperative research per institution with "public research institutions," followed by 1.22 projects with "national and public research institutions."

Industrial research institutions had the largest number, 2.1 projects, of cooperative research per institution with "private firms," followed by 0.99 project with "universities and private firms," and 0.9 project with "public research institutions" (Figure 8-4-14).

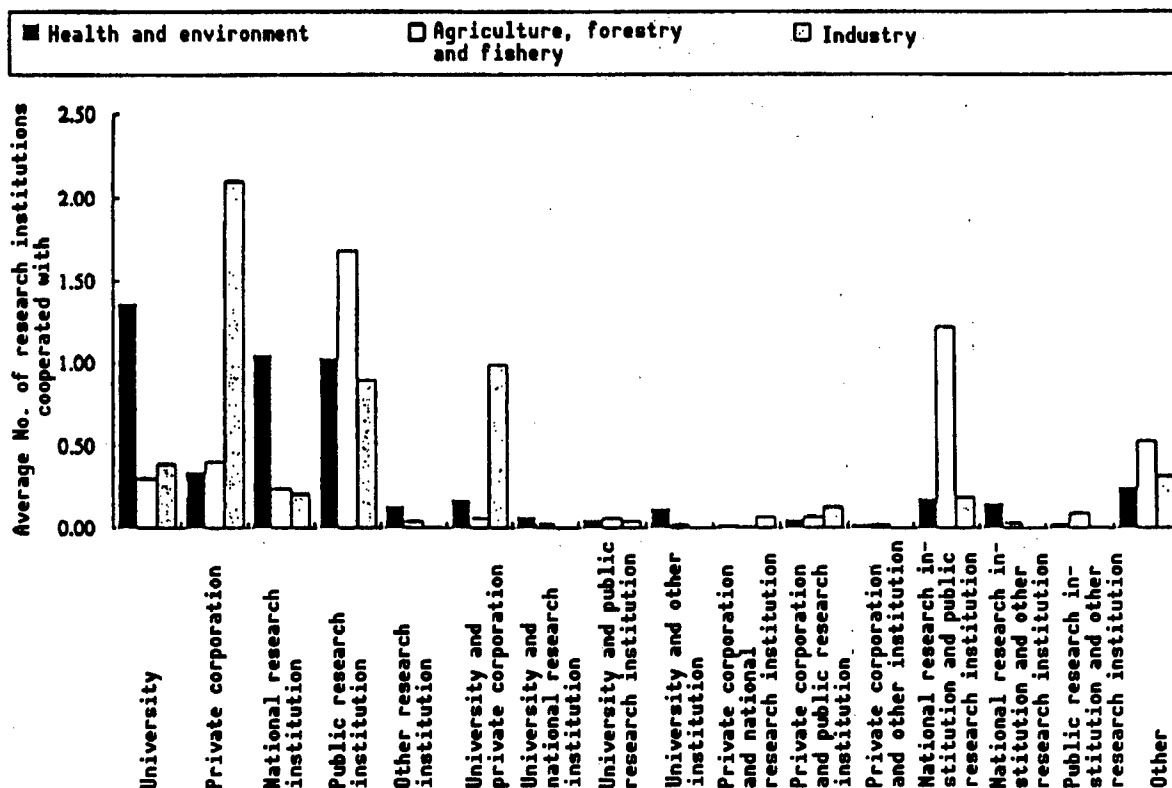


Figure 8-4-14. Partners in Cooperative Research by Department

(c) Average Duration of Cooperative Research Projects

Of the 49 public health and environmental research institutions that replied, "2-3 years" was the most common, 15 institutions (31 percent), followed by 11 institutions (22 percent) with "3-5 years."

Of the 180 agriculture, forestry and fishery related research institutions that replied, "3-5 years" was the most common, 111 institutions (62 percent), followed by 41 institutions (23 percent) with "2-3 years."

Of the 62 agriculture, industrial research institutions that replied, "1-2 years" was the most common, 21 institutions (34 percent), followed by 19 institutions (31 percent) with "6 months-1 year" (Figure 8-4-15).

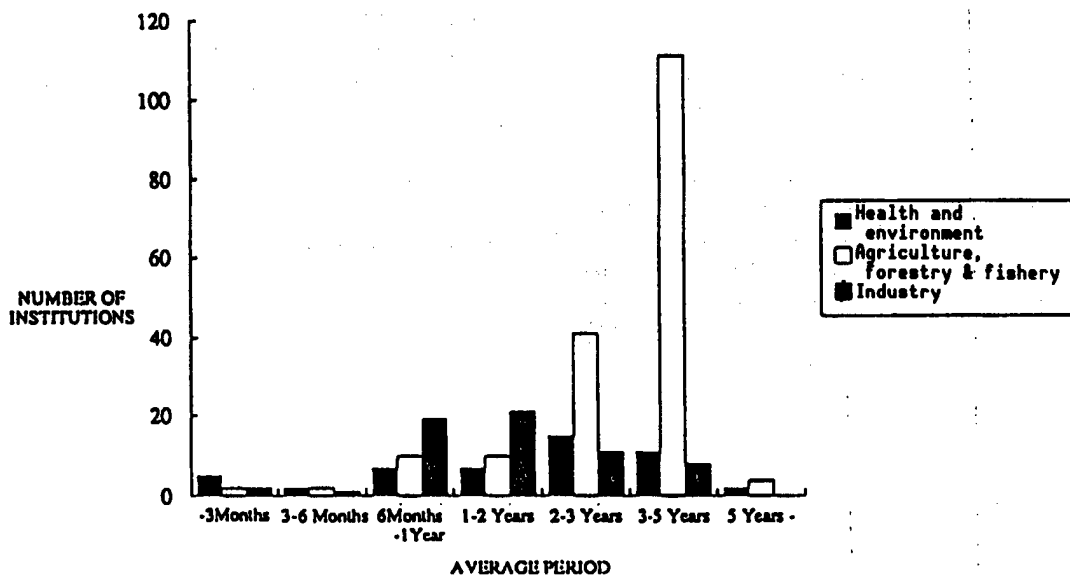


Figure 8-4-15. Average Period of Cooperative Research Projects

(d) Average Budget of Cooperative Research Projects

Of the 53 public health and environmental research institutions that replied, "less than ¥1 million" was the most common, 29 institutions (55 percent), followed by 18 institutions (34 percent) with "¥1-5 million."

Of the 182 agriculture, forestry and fishery related research institutions that replied, "¥1-5 million" was the most common, 99 institutions (54 percent), followed by 33 institutions (18 percent) with "less than ¥1 million."

Of the 62 industrial research institutions that replied, "¥1-5 million" was the most common, 19 institutions (31 percent), followed by 14 institutions (23 percent) with "¥20-50 million" (Figure 8-4-16).

(e) Cooperative Research Areas

Of the 47 public health and environmental research institutions that replied, "environment and pollution" was the most common, 39 institutions (34 percent), followed by 35 institutions (30 percent) in "public hygiene."

Of the 140 agriculture, forestry and fishery related research institutions that replied, "general agriculture and crops" was the most common, 85 institutions (25 percent), followed by 64 institutions (19 percent) in "biotechnology," 43 institutions (13 percent) in "veterinary and the animal husbandry," and 28 institutions (8 percent) in fishery.

Of the 46 industrial research institutions that replied, "new materials" was the most common, 32 institutions (14 percent), followed by 31 institutions (13 percent).

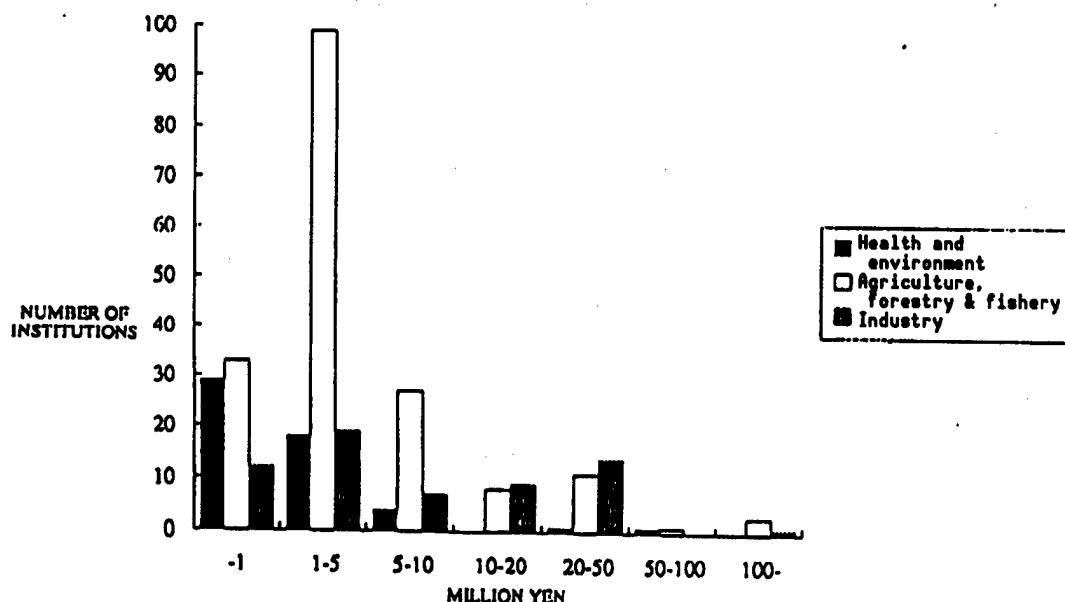


Figure 8-4-16. Average Budget for Cooperative Research Projects

percent) in "electronics, communications and information engineering," 24 institutions (10 percent) in "mechanical engineering," 22 institutions (10 percent) in "iron-steel and metallurgical engineering," 20 institutions (9 percent) in "food engineering," and 17 institutions (7 percent) in "ceramics" (Table 8-4-9).

(f) Procedures for Initiating Cooperative Research Projects

Of the 322 institutions that replied, the largest number, 95 institutions (30 percent) reported that "our researchers directly initiated," while 87 institutions (27 percent) reported that "partners of joint research programs initiated" (Table 8-4-10).

(g) Participation by Mediators

Of the 92 institutions that replied, the largest number, 45 institutions (49 percent) used "central government agencies" as mediators, while 32 institutions (35 percent) used "regional government agencies" (Table 8-4-11).

(h) Evaluation of Cooperative Research Achievements

Of the 331 institutions that replied, the largest number, 145 institutions (44 percent) evaluated "in consultation with partner institutions," while in 44 institutions (13 percent) achievements were evaluated by "head of the institution or division chiefs." Only 21 institutions (6 percent) evaluated "through a reviewing panel made of outside experts" (Table 8-4-12).

Table 8-4-9. Cooperative Research Areas

(Multiple answer: No. of institutions)

	Health and environment	Agriculture, forestry and fishery	Industry
Agriculture and crop	1 (1)	85 (25)	5 (2)
Veterinary and livestock industry	1 (1)	43 (13)	0 (0)
Forestry	2 (2)	28 (8)	4 (2)
Fishery	1 (1)	42 (12)	1 (0)
Food industry	7 (6)	17 (5)	20 (9)
Sericulture and fiber industry	0 (0)	17 (5)	14 (6)
Chemistry	4 (3)	1 (0)	15 (6)
Pharmaceuticals	10 (9)	4 (1)	2 (1)
Atomic energy and energy	1 (1)	0 (0)	3 (1)
Space development	0 (0)	0 (0)	0 (0)
Ocean development	0 (0)	5 (1)	3 (1)
Biotechnology	9 (8)	64 (19)	15 (6)
Civil engineering and construction industry	1 (1)	1 (0)	4 (2)
Ceramic industry	0 (0)	0 (0)	17 (7)
Steel and metal industry	0 (0)	2 (1)	22 (10)
New material	0 (0)	6 (2)	32 (14)
Mechanical engineering	0 (0)	4 (1)	24 (10)
Electronics, telecommuni- cations engineering and information engineering	1 (1)	4 (1)	31 (13)
Other electronic engineering	0 (0)	1 (0)	2 (1)
Environment and environmental pollution	39 (34)	17 (5)	9 (4)
Hygienic science	35 (30)	1 (1)	1 (0)
Other	3 (3)	1 (0)	7 (3)
Total	47 (100)	140 (100)	46 (100)

Table 8-4-10. Procedure for Initiating Cooperative Research
(No. of institutions (%))

Making approaches directly to a cooperative research partner	95 (30)
Making approaches through mediator of your research institution	46 (14)
Making approaches through the coordinating division in your research institution	44 (14)
Making approaches directly to researcher in your research institution	87 (27)
Making approaches through a cooperative research partner mediator	30 (9)
Other	20 (6)
Total	322 (100)

Table 8-4-11. Affiliation of Mediator
(No. of institutions (%))

Central government	45 (49)
Local government	32 (35)
Private institutions	2 (2)
Third sector	2 (2)
Others	11 (12)
Total	92 (100)

Table 8-4-12. Cooperative Research Result Assessment
(No. of institutions (%))

Not assessed in particular	76 (23)
Assessed in advisory body that people of experience or academic standing organize	21 (6)
Assessed in conference in research institution	24 (7)
Assessed by institution promoting science and technology	3 (1)
Assessed by head of department or research institution	44 (13)
Assessed by planning and coordinating division in research institution	4 (1)
Consult with partner in cooperative research while assessing	145 (44)
Others	14 (4)
Total	331 (100)

(i) Handling of Cooperative Research Results

Of the 334 institutions that replied, 271 institutions (81 percent) reported "no difficulty" in handling the results of cooperative research projects (Table 8-4-13).

Table 8-4-13. Problems With Cooperative Research Results
(No. of institutions (%))

Nothing worthy of special mention	271 (81)
Restrictions on publication and privacy of research	24 (7)
Ownership of intellectual property	24 (4)
Use of intellectual property	20 (6)
Other	5 (2)
Total	334 (100)

9. Summary of Survey Results

Since our survey was wide-ranging, we reiterate our summary here.

Survey results are described in Sections 3.1 through 8.4 of the text, and the summary listed below match those section numbers

- 3.1 Although the number of prefectures that had established S&T-related councils has increased, not many prefectures had established offices dedicated to S&T policies.

Recently, an increasing number of prefectures have established S&T Forums or Councils, which consist of scholars and experts, to examine policies to promote regional S&T. At present, 11 prefectures—Hokkaido, Iwate, Kanagawa, Toyama, Ishikawa, Yamanashi, Kyoto, Osaka, Hyogo, Hiroshima and Yamaguchi—have an active S&T Forum or Council.

Of the prefectures that have offices dedicated to S&T policies, only 3 prefectures—Hokkaido, Saitama and Kanagawa—have office names that include the term "Science and Technology."

- 3.2 The number of prefectures that have adopted basic guidelines for S&T policies has increased.

Recently, an increasing number of prefectures have adopted basic guidelines for S&T policies, through the above mentioned S&T-related councils, in order to clearly identify the role of prefectural S&T policies. At present, 9 prefectures—Hokkaido, Iwate, Saitama, Kanagawa, Toyama, Yamanashi, Shizuoka, Osaka and Hyogo—have adopted basic guidelines for S&T policies. Ardent discussions are in progress in Yamaguchi and Hiroshima Prefectures.

- 4.1 (1) The total budget for regional S&T-related activities is about one-quarter of the national budget.

S&T-related expenditures in FY1990 were about ¥10 billion per prefecture and ¥5.9 billion per designated city. The total S&T-related expenditure spent by local governments is estimated to be about ¥573.2 billion.

This amount is 26.7 percent of the total S&T-related expenditure of the central government, ¥2,140.7 billion.

Subsidies to local governments that were included in the national S&T-related budget amounted to a total of approximately ¥28.3 billion, or 1.4 percent of the national budget (FY1991).

The ratio of the S&T budget to the total budget is 1.36 percent for the central government (FY1991, general account only), while that for local governments is 1.26 percent. The ratio to the national gross product is 0.53 percent, while the ratio to the prefectural gross product is 0.13 percent.

- 4.1 (2) Regional S&T-related budgets are most often managed by agriculture, forestry and fishery departments, and about 60 percent of the budgets are allocated to public research institutions.

Regional S&T-related budgets are managed by various types of departments, and their structures vary widely among local governments. Agriculture, forestry and fishery departments are in charge in about one-third of the local governments [surveyed], commerce and industry departments supervise in about one-quarter of the cases, and planning and general affairs departments oversee in about one-sixth of the cases.

Expenditures for public research facilities accounted for 61.3 percent of the total budget (including expenses for reorganization and improvements), and expenditures for research institutions directly operated by local governments, such as "public research institutions and universities," accounted for 81.1 percent of the total budget. This share amounted to 68.2 percent of the total budget even when payroll was excluded.

About 60 percent of public research institutions conducted activities related to agriculture, forestry and fishery.

Of the budgets for public research institutions, 57.5 percent was payroll, while R&D-related expenditures accounted for 11.1 percent. The average budget per institution was about ¥56 million.

- 4.2 (1) Regional S&T-related budgets are dispersed in a wide range of expenditures. Detailed analyses are desirable in the future on the relation between the budgets and population, prefectural gross products and total [prefectural] budgets.

Even when we looked at "regular budgets" that excluded "budgets for public institutions for higher education" and "budgets for reorganizations and improvements of public research institutions," regional S&T-related budgets ranged widely from ¥2.7 billion to ¥21.5 billion for prefectures and from ¥0.8 billion to ¥15.2 billion for designated cities.

A prefectural distribution in steps of ¥2 billion revealed that the highest number, 15 prefectures (one-third [of the prefectures surveyed]), had an annual budget of ¥4 billion or more but less than ¥6 billion.

"Regular budgets" of prefectures exhibited correlation with four parameters—"population," "prefectural gross products," "total budgets," and the "number of researchers." (Correlation coefficients ranged from 0.678 to 0.722).

The relation between these parameters and [prefectural S&T-related] budgets, such as "S&T-related budgets per capita" and the "ratio of S&T-related budgets to prefectural gross products," has been illustrated in the text. More detailed analyses are needed in the future.

- 4.2. (2) A simple correlation was not observed between the departments that oversee S&T-related budgets and [prefectural] industrial structures, but more detailed analyses are needed.

Organizational structures of departments in charge of prefectural S&T-related budgets were very different from one prefecture to another. No simple correlation was observed between the ratios of the S&T budgets managed among "agriculture, forestry and fishery departments," "commerce and industry departments" and "other departments" and the structural ratios of the "primary industries," "secondary industries," and the "tertiary industries."

Quartile graphs using the central values of these two types of ratios are included in the text, but more detailed analyses are needed in the future.

- 5.1 New R&D facilities are deployed throughout the country as a result of national policy implementations and regional initiatives.

Since the technopolis initiative in 1983, 8 national policy programs were implemented to encourage regional deployment of R&D facilities. These programs have been managed by 5 national agencies.

There were also regional initiatives, through which 81 R&D facilities were established since 1984. Local governments and public organizations have funded, invested in or are directly operating these facilities in 37 prefectures. There are 47 facilities established according to the central government's policy implementation in 29 prefectures.

Although these new R&D facilities are relatively small, with an average of 15.67 researchers per facility, they own relatively many expensive measuring and testing instruments, and are hosting relatively many foreign researchers.

- 5.2 Support for R&D activities is targeted for diverse creativity in S&T.

To support R&D activities by regional businesses and research institutions, local governments are spending ¥25.7 billion, or 8.0 percent of regular S&T-related budgets that exclude expenditures for reorganizing and improving public research institutions.

While the traditional guidance and support, such as "technical consulting and guidance" and "support for improving technology," are still the mainstream, 35 local governments replied that they were spending ¥13.5 billion for "inviting, fostering and supporting R&D-type enterprises," indicating their goal of diverse creativity in S&T.

- 5.3 (1) Measures to foster young researchers are being carried out by 40 percent of local governments.

Local governments are spending ¥15.8 billion, or 4.5 percent of regular S&T-related budgets, to foster research manpower.

Although almost all local governments responded to our questionnaire on fostering manpower, only 21 local governments, or 40.4 percent all respondents, confirmed "fostering young (35- years old or under) researchers."

5.3 (2) Local governments that responded to "fostering public's understanding of S&T" accounted for 44.2 percent of all respondents.

Local governments spent ¥16.8 billion, or 4.8 percent of regular S&T-related budgets, to educate the public and disseminate information about S&T.

Of the respondents, only 23 local governments, or 44.2 percent, had programs to "foster public's understanding of S&T."

5.4 About one-half of local governments are responding to internationalization of S&T.

Local governments spent ¥15.5 billion, or 4.4 percent of regular S&T-related budgets, to respond to internationalization of S&T. There were 25 local governments, or 48.1 percent, with programs for this purpose.

Hosting research trainees from China and South Korea is noteworthy in "promoting international exchange, such as supporting foreign researchers." (15 projects out of 27).

6. There are 121 third-sector research (development and support) organizations or foundations funded or invested by local governments. Cumulative sum of endowments is approximately ¥200 billion.

A total of 45 prefectures and 7 designated cities replied on the subject of foundations or third-sector research (development and support) organizations funded or invested by local governments. There were 61 institutions that conduct own research and 69 facilities to support R&D, a total of 121 institutions (duplicate replies included).

These institutions were mostly established in the 1980s, and the cumulative sum of endowments was ¥194.7 billion. Local governments provided ¥67.7 billion, or 34.8 percent.

Local governments provided 39.4 percent of the funds for research (development and support) foundations, while they provided 15.9 percent of research (development and support) corporations.

Research (development and support) corporations were established since 1986.

The amount paid in a single year to foundations or to third sector research (development and support) organizations was ¥14.3 billion, or about 4.1 percent of regular S&T-related budgets.

7. "Regional institutions" have few joint research projects with "universities" and "national research institutions."

Partners of regional institutions in joint research projects were mostly private firms, accounting for 471 projects, followed by 443 projects with public research institutions.

On the other hand, there are not many joint research projects with universities or national research institutions, accounting for 28 projects and 16 projects, respectively. Even if we include three-way joint projects among "universities, private firms, and regional institutions," "national research institutions, private firms, and regional institutions," and "universities, national research institutions, and regional institutions" and four-way joint projects among "universities, regional institutions, private firms, and regional institutions," these projects amount to only 34 cases and 33 cases, respectively.

8.4 Research activities in public research institutions

- (1) Hokkaido has the largest number of researchers in public research institutions.

According to the "National Register of Testing and Research Organizations" ([published by] Lattice), Hokkaido has the largest number of researchers in public research institutions, followed by 830 researchers in Tokyo Metropolis, 748 researchers in Osaka Prefecture, 741 researchers in Aichi Prefecture, and 629 researchers in Kanagawa Prefecture.

- (2) Historical cumulation [of experience] by public research institutions for 100 years

Public research institutions started during the Meiji era, and about one-half of them were established in or before 1950. Agriculture, forestry and fishery related research institutions were built first, followed by industrial research institutions. After World War II, public health related institutions, such as hygienic research laboratories, were established, and environmental research institutions, such as pollution research laboratories, were established since the late 1960s.

- (3) Agriculture, forestry and fishery related research institutions are the most numerous among public research institutions.

Agriculture, forestry and fishery related research institutions account for 60 percent of all public research institutions, followed by 19 percent of public health and environmental research institutions and 19 percent of industrial research institutions.

- (4) Most public research institutions are small.

Almost 80 percent of all public research institutions are small, having less than 50 employees each (81 percent of public health and environmental institutions; 74 percent of agriculture, forestry and fishery related institutions; and 79 percent of industrial institutions).

(5) There has not been any change in the number of technicians since 1985.

According to the "FY1991 S&T Research Survey Report," the number of technicians per principal researcher is larger in public research institutions than in national research institutions (the ratio of national to public institutions = 0.04 to 0.05 technicians in industrial institutions; 0.45 to 0.71 technicians in agricultural institutions; and 0.20 to 0.06 technicians in public health institutions). Also, the number of technicians in public research institutions did not change since 1985.

(6) The number of researchers 45-years old and over in public health and environmental public research institutions will rapidly increase in the next 10 years.

Public research institutions are established and researchers are hired according to social needs of each era. In general, these institutions hire young researchers when they are established, but there is little mobility. We expect that the fraction of researchers 45-years old and over in public health and environmental research institutions will rapidly increase in the next 10 years since researchers in the 35-45 year old bracket account for a relatively large fraction, 44 percent, of the staff of these institutions as of 1990.

(7) The educational level of researchers in public research institutions is rising steadily.

Although the educational level of researchers in public research institutions is rising steadily since 1980, those who have a master's or higher degree account for only 16 percent, while more than 50 percent of researchers have a master's or higher degree in national research institutions.

(8) About one-third of public research institutions implemented large-scale reorganizations since 1984.

Since 1984, 35 percent of public research institutions went through large-scale reorganizations. An increasing number of them have established planning and coordinating offices within institutional organizations (27 percent of institutions have such offices as of 1990). Research managers consider "education and training of researchers" the most important factor in maintaining and improving research potentials.

The average annual salary of (30-years old) researchers in public research institutions was "¥4 million or above but less than ¥4.5 million." Public research institutions that were hosting foreign researchers accounted for only 8 percent, and these researchers stayed for less than one year.

(9) In general, public research institutions owned only a few expensive measuring and testing instruments.

The average number of measuring and testing instruments that cost ¥10 million or more per public research institution was 5 for public health and environmental research institutions, followed by 2 for agriculture, forestry

and fisher related research institutions. Although industrial research institutions had more than other type of institutions, their average number was still only 15.

Nagano Prefecture had the most, 125, measuring and testing instruments that cost ¥10 million or more, followed by 119 in Aichi Prefecture, 107 in Hyogo Prefecture, 105 in Shizuoka Prefecture, and 98 in Fukui Prefecture.

(10) Major businesses of public research institutions are three types: "Research," "technical guidance and consulting," and "analyses and tests by requests."

Most work performed at public research institutions belonged to three categories: "Research," "technical guidance and consulting," and "analyses and tests by requests." The actual number of cases under each category has been listed in the text. There were wide fluctuations in replies concerning "technical guidance and consulting" and "analyses and tests by requests." How much emphasis is given to each category should be analyzed in detail in the future.

Comparison of papers published (an average of 1987 through 1990) by public research institutions indicated that Osaka Prefecture had the largest number, 527 publications, followed by 512 publications by Tokyo Metropolis, 458 publications by Hokkaido, 387 publications by Aichi Prefecture, and 330 publications by Shizuoka Prefecture.

When this number is further reduced to the average per researcher, Ibaraki Prefecture topped with 0.76 publication, followed by 0.71 publication by Tochigi and Shizuoka Prefectures, respectively, 0.70 publication by Osaka Prefecture, and 0.68 publication by Saitama Prefecture.

(11) About 70 percent of public research institutions conduct joint research.

Although about 70 percent of public research institutions were partners in joint research projects, more than one-half of them had 3 or less joint projects per institution. The most common partners of joint research by public health and medical institutions were universities, those by agriculture, forestry and fishery institutions were other public research institutions, while industrial research institutions had most of their joint projects with private firms. The most common average duration for joint projects in public health and environment was "2 to 3 years" and that in agriculture, forestry and fishery was "3 to 5 years," while the average duration of industrial joint projects was "1 to 2 years." The most common average annual budget for joint projects in public health and environment was "under ¥1 million," while that in agriculture, forestry and fishery related and industrial projects was "¥1-5 million."

Joint projects were mostly initiated through "direct contact between researchers." Few projects were arranged by coordinators.

10. Conclusion

To systematically identify the task of "promoting regional S&T" as was mandated in the Basic Guidelines for S&T Policy—the task of "systematizing regional S&T policies"—is a long-term assignment for us, who study policies.

In this study, we conducted a comprehensive survey of systems and implementations adopted by regional public organizations, centered around prefectures and designated cities, for promoting S&T as the first step [to carry out our assignment.]

The results of the survey are now published here as "Current Status and Tasks for S&T Policies of Prefectures and Designated Cities." We present the following six conclusions from our study.

(1) Regional public organizations must maintain systems for S&T promotion.

There are 11 prefectures that have established S&T-related councils, such as S&T Forums and Councils, and 9 prefectures that have adopted basic guidelines for S&T policies. These actions indicate that local governments themselves are recognizing the promotion of S&T as their own policy tasks.

However, except for Hokkaido in 1952 and Kyoto Prefecture in 1961, all other prefectures have established such councils since 1982, indicating that these actions constitute a new trend developed in the last 10 years.

As was revealed by the recipients of our survey questionnaires, only a few local governments have administrative offices dedicated to S&T policies (only Hokkaido, Saitama and Kanagawa Prefectures use the phrase S&T in the names of such offices).

To "promote regional S&T," it is necessary to continuously maintain S&T promotion systems from two viewpoints—adoption of basic systems and framework for regional policies through councils and basic guidelines, and establishment of organizations with clearly defined administrative roles.

(2) Regional public organizations must clearly understand appropriate levels of S&T budgets, while the S&T policy of the central government must be examined taking regional situations into consideration.

The total S&T-related expenditure paid by local governments in FY1990 is estimated to be approximately ¥573.2 billion. This is approximately one-quarter (26.7 percent) of the total national S&T-related budget of ¥2,140.7 billion.

The average ratio of regional S&T-related budgets to total budgets is 1.26 percent, about the same level as the ratio in the general account part of the national budget, 1.36 percent.

S&T-related budgets of local governments are widely scattered [in their usage]. Although we have clearly recognized some correlation to "population" and "prefectural gross product," we did not see any simple correlation, as was

already mentioned, in "per capita S&T-related expenditures," "the share of S&T-related budgets in prefectural gross product," or in the "relation between administrative distributions of S&T-related budgets and prefectural industrial structures." More detailed analyses are needed in the future.

In the future, it is necessary for each local government to clearly understand and adopt its S&T budget appropriate to own industrial structure, policy goals and total budget as soon as possible. At the same time, the implementation of the national S&T policy must be examined by taking local situations, such as regional S&T potentials and policy trends, into consideration.

(3) It is necessary to examine long-term strategies and actual implementation methods for regional S&T policies.

In the past, S&T policies of local governments were mainly aimed at "responding to the needs" of existing beneficiaries, such as regional small and medium businesses, and agricultural, forestry and fishery industries, by providing technical guidance and support. We have confirmed through our survey that implementations to "respond to the needs," such as "technical consulting and guidance" and "technology development and support for advancing technology," have widely been adopted.

After the technopolis concept was proposed in the early 1980s, however, the national policy is shifting toward "self-motivated development with the goal of independent regional development." Some local governments have started to implement policies for "creating seeds," such as creating institutions that will play major roles in S&T activities. The fact that local governments have funded or invested in a total of 121 "research" and "R&D support" institutions and another fact that 35 local governments are "inviting, fostering and supporting R&D enterprises" indicate that implementations of policies for "creating seeds" have begun.

Moreover, some of the newly established "research institutions," such as the Kanagawa S&T Academy and Osaka Bioscience Research Institute, take basic research seriously and are carrying out such research.

This survey has also identified the fact that mutual cooperation between "universities" or "national research institutions" and "regional research institutions" did not progress much, although almost all local governments have implemented policies to promote "research exchange among industry, academia and government." The number of cooperative research projects performed in 1990 between regional research institutions and universities or national research institutions was only 34 cases and 33 cases, respectively.

In order to steadily implement S&T policies to "create seeds" that emphasize basic research in the future, long-term strategies—from basic research to practical applications through applied research and development research—must be examined as well as practical means to promote research exchange.

(4) Roles of research institutions that support regional S&T activities must be examined.

Approximately 60 percent of S&T-related budgets of local governments is spent to operate public research institutions, which play central roles in regional S&T policies.

The main duty of these public research institutions is to respond to the technical needs of regional agricultural, forestry and fishery industries and small and medium businesses. Their activities are focused around "research," "tests and analyses," and "technical guidance and consulting." Approximately 80 percent of the institutions are rather small, employing less than 50 persons. In general, these institutions have few expensive measuring and testing instruments, and few employees hold doctorate.

Under these circumstances, approximately one-third of public research institutions carried out large-scale reorganizations since 1984, 30 prefectures reorganizing their research institutions in 1990 alone.

On the other hand, as was stated earlier, there are a total of 121 "research" and "R&D support" institutions nationwide funded or invested by local governments. The cumulative sum of endowments for these institutions has reached almost ¥200 billion at the time of this survey.

As part of the S&T policies to "create seeds," the objective, form, operation, and management of such institutions are being re-examined.

(5) Framework to internationally contribute or to form an international network is important.

Approximately one-half of local governments are responding to internationalization of S&T. Actual activities are mostly hosting researchers and trainees from China and South Korea (15 projects out of 27 projects that replied), while only few projects hold international conferences and symposia or conduct cooperative research.

Some public research institutions began to host foreign researchers, accounting for 8 percent of all public institutions. Most visitors stay for less than one year. It is necessary in the future to expand a system to host foreign researchers.

In view of a century of accumulated experience by public research institutions, their international roles in the future will become increasingly important, in activities to form an international network of world-class research laboratories with the goal of promoting global S&T and internationally contribute particularly to developing countries.

(6) It is important to implement means to discover, foster and secure human resources that will carry out regional S&T activities.

To implement S&T policies to "create seeds," the existence of an organizer, who will discover high-quality S&T seeds in each region, combine them with

other human resources and foster them into projects, is important. This capability heavily depends on personal qualities; such a person must understand contents of research projects from a wide viewpoint, be able to coordinate diverse activities, and comprehensively carry out projects. Discovering such persons is the most important task.

Then, it is important to foster and secure researchers and technicians who bear the main burden of S&T activities, particularly fostering and securing outstanding young researchers.

This survey identified that approximately 40 percent of local governments encourage young researchers by sending them to universities and private firms. It is important to reinforce this type of activity in the future.

Since S&T administration was a new experience for regional administration, it is also important to foster and secure administrators who will set up plans. Implementing means to discover, foster and secure diverse human resources, who will carry out regional S&T activities, such as organizers, researchers, technicians and administrators, is important.

11. Future Tasks

In additions to the six conclusions of our survey presented in the preceding chapter, we list five future tasks.

(1) Relation between the so-called "plan to double central government's investments in R&D" and S&T budgets of local governments.

In the "Basic Guidelines for S&T Policy" (issued on 24 April 1992), the government has announced its intention to "endeavor to double the government's investments in R&D as early as possible."

In the "Methods of Comprehensively Promoting Academic Research Aimed at the Twenty-First Century" (published on 23 July 1992), the Science Council has recognized that "in recent years the government budget for academic research had difficulties in keeping up with the rising research costs and general advances in all field of academic research," and pointed out that "it is urgent to maintain a foundation for academic research."

On the other hand, in "Our Hope to Establish an R&D System Aimed toward the Twenty-First Century" (published on 8 October 1991), the Federation of Economic Organizations has proposed to abolish the ceiling for S&T-related budgets and budgets for higher education, and to double R&D-related budgets of the central government to one percent of GNP in five years.

As indicated above, many sources are proposing to increase Japan's R&D investments these days. These discussions, however, mostly concern S&T-related budgets of the central government; very few pay attention to S&T-related budgets of local governments. As was stated earlier, the sum of S&T-related budgets of local governments amounts to approximately one-quarter of the total S&T-related budget of the central government. When we examine Japan's R&D investments in the future, we must discuss R&D investments by local governments as well, including complementary roles of S&T policies of the central government and those of local governments.

(2) Examine S&T Policies from a Regional Viewpoint beyond Prefectures

Recently, there have been examples of S&T policies that encompass multiple prefectures, such as the Northeast Intelligent Cosmos concept, Kansai [Western Japan] Cultural and Academic Research City, and Northern Kyushu Research and Academic City Construction concept. In addition to the reality that socio-economic activities are regional, the necessity to effectively support regional S&T activities with a limited supply of researchers, technicians, research facilities and funds forces us to examine the means to promote S&T policies from a regional viewpoint that encompasses many prefectures in the future.

(3) Examine the Relation between "S&T Promotion" and "Regional Vitalization"

Once we embrace the viewpoint that "advances in S&T are indispensable to economic development," then "promotion of regional S&T" plays a central role in the strategic task of "regional vitalization" including regional economic development.

Until now, however, not enough discussions were devoted on "how to promote regional S&T, create new industrial seeds, foster them, and how to relate them to regional development." It is necessary, therefore, to examine in the future how S&T promotion will be related to regional vitalization, including the development of regional economy.

Since Japan must play a role in leading the world now, this type of examination is important also in creating and fostering new industries and contributing to a stable global economy by transferring such industries to the rest of the world.

(4) Examine "Systematization of Regional S&T Policies" and "Guidelines for Regional S&T"

When we examine the basic directions of S&T policies of local governments, some aim at "industrial vitalization," while others strive for "realization of abundant life" or "realization of cultural environment rich in creativity." What policy goals and idealism should local governments adopt to "promote regional S&T?" Research on "systematization of regional S&T policies" are necessary to answer this question and to clarify the points raised in paragraphs (1)-(3) above.

As a sequel to this survey, NISTEP has decided to conduct a comprehensive survey study that includes other research organizations that were not included in this survey, such as local businesses and universities.

In addition, as a method to evaluate the effectiveness of regional S&T policies, we will examine "regional S&T indicators" in the future. In this method, we will not only clarify the concept of S&T, but also attempt to define regional S&T potentials as indicators. Our achievements will widely be reported in the international arena.

(5) It Is Also Important that the Concept of "Promoting Regional S&T" Be Accepted as a General Concept.

In this survey, we replaced "region" with local governments such as "prefectures."

Our survey showed that each prefecture had its own perception of "S&T."

For future survey studies, it is important that the concept of "promoting regional S&T" be accepted as a general concept.

- END -